

3.0 Transportation

This chapter summarizes the characteristics of the existing transportation system in the VBTES Corridor and discusses the potential impacts and mitigation associated with the build alternatives. This chapter consists of four sections: Streets and Highway Network (Section 3.1), Transit Network and Transit Facilities (Section 3.2), Parking Facilities (Section 3.3), and Bikeways and Pedestrian Facilities (Section 3.4).

3.1 Streets and Highway Network

This section describes the existing and potential future street and highway roadway operations in the VBTES Corridor. It identifies potential direct and indirect effects to those facilities from the implementation of the VBTES build alternatives, and it identifies potential mitigation measures for those effects. A more detailed discussion of the traffic analysis and results is provided in the *Traffic Operations Technical Report*, Appendix J of this DEIS.

3.1.1 Legal and Regulatory Context

Under Commonwealth of Virginia statutes, the City of Virginia Beach is responsible for the operation and maintenance of the streets within the City except the interstate highways. The Virginia Department of Transportation (VDOT) provides some funding for the maintenance of local roads; however, the majority of funds for operation, maintenance, and expansion of the city’s streets comes from the City. VDOT operates and maintains the interstate highway system including I-264 and I-64 using a combination of state and federal funds.

3.1.2 Methodology

The traffic analysis methodology for the VBTES is summarized below.

Data Collection

Traffic operations data was obtained from the City of Virginia Beach, the Hampton Roads Transportation Planning Organization (HRTPO), and VDOT. Data gathered for this

DEIS included recent traffic counts where available, travel demand model output, traffic signal timing data, and roadway geometric data. HRTPO’s Transportation Improvement Plan (TIP) and the City’s Capital Improvement Plan (CIP) were reviewed to determine locations of known planned and/or programmed (funded) transportation improvements within the VBTES Corridor.

Traffic counts in the VBTES Corridor were assembled from the City of Virginia Beach’s Traffic Count Database System (TCDS). This database contains 24-hour traffic counts and intersection turning movement counts, usually data collected on a Tuesday, Wednesday, or Thursday, at various locations in the City. The counts are raw data and are unadjusted for seasonality or other variations. When counts were not available through the TCDS, weekday morning (7:00 to 9:00 AM) and evening (4:00 to 6:00 PM) peak period intersection turning movement counts were collected in May and June of 2013. The counts were conducted on a clear day when area schools were in session.

In addition to morning and evening peak period intersection counts, 24-hour daily volume counts were collected for key roadways within the VBTES Corridor where TCDS data were unavailable.

Traffic Analysis Tools

The operational analysis for the study area intersections was completed using Synchro 8.0, a computer-based intersection operations model that replicates procedures from the *Highway Capacity Manual* (HCM) (Transportation Research Board, 2000 and 2010). The program was used to assess both the current and future operation of intersections in the VBTES Corridor.

Analysis of potential grade separated crossings was performed using criteria identified in the Institute of Transportation Engineers (ITE) Light Rail Transit Grade Separation Guidelines report, dated March 1992. The ITE methodology considers operational, safety, institutional, and financial issues in evaluating whether a crossing should be grade separated. The proposed grade separated crossings are identified in Chapter 2, Tables 2.1-3A and 2.1-4A, and additional detail regarding the grade separation analysis can be found in Appendix J.

Performance Measures

The key performance measure analyzed in this DEIS is intersection level of service (LOS). LOS is a qualitative measure of how effectively an intersection processes traffic. In general terms, LOS is a function of vehicle delay through an intersection. Six levels of service are defined with letter designations from A to F, with LOS A representing the best operating conditions and LOS F representing the worst.

The City of Virginia Beach has identified LOS D as the minimum acceptable level of service for design purposes. For this analysis, intersections that operate or would operate in the forecast year below LOS D (LOS E and F) have been identified as below standard.

Level of service is determined differently for signalized and unsignalized (stop sign controlled) intersections. This is due primarily to driver expectations and behavior. For signalized intersections, LOS is a measure of driver discomfort and frustration and lost travel time for all movements through an intersection. For unsignalized intersections, delay is measured only for vehicles waiting to cross or turn from streets that have a stop sign onto a road where traffic moves freely. Table 3.1-1 summarizes the LOS criteria.

Assumptions

The following assumptions were considered for this analysis:

- ~ The traffic volumes and signal data collected in the City’s 2009 traffic signal optimization study were assumed to represent 2013 conditions, as traffic in the VBTES Corridor has remained relatively constant due to recent economic conditions. At locations where traffic volumes were not available, traffic volumes were interpolated and distributed based on existing morning and afternoon peak hour travel patterns from the nearest study area intersection with available counts.
- ~ The Hampton Roads Regional Travel Demand Model was used to derive the rate of growth for traffic between the current year (2013) and the forecast year (2034).
- ~ Train control (for LRT alternatives) or bus control (for BRT alternatives) at currently signalized at-grade crossings would require automated crossing gates. These gates would pre-empt (alter) the normal red-yellow-green cycle of the intersection to give priority

Table 3.1-1 | Intersection Level of Service Criteria

	Description of Condition	Level of Service (LOS)	Intersection Control Delay	
			Signalized (seconds/vehicle)	Unsignalized (seconds/vehicle)
Delay meets standards	Few delays at intersection	A	0-10	0-10
	Slight level of delay	B	>10-20	> 10-15
	Fair level of delay	C	>20-35	>15-25
	Noticeable delay	D	>35-55	>25-35
Delay exceeds standards	Signal cycles frequently fail	E	>55-80	>35-50
	Over capacity	F	>80	>50

Source: 2000 Highway Capacity Manual (Special Report 209)



to the passing transit vehicle. This is the most conservative approach to vehicle operations and shows the highest level of potential impacts. Traffic crossing the tracks/busway would be stopped while traffic parallel to the tracks/busway would be allowed to continue. It is anticipated that the operation of the crossing gates would be approximately 35 seconds. These operating assumptions will be revisited during later phases of design as part of the engineering analysis of each crossing.

- ~ Future roadway improvements on Witchduck Road that include roadway widening and access changes near the I-264 interchange and an increase in the number of lanes along Laskin Road between Republic Road and Oriole Drive (from the current four to a planned eight) are included in the No Build condition. To accommodate the fixed guideway in Alternative 3, Laskin Road would have six lanes from Phillip Avenue to east of Birdneck Road.
- ~ Improvements to roadways identified in **Chapter 2** and **Table 3.1-5** have been incorporated in the analysis of build alternatives.

3.1.3 Existing Conditions

The roadway network within the VBTES Corridor links neighborhoods, retail, employment, and recreation destinations. **Table 3.1-2** shows the major roadways in the VBTES Corridor along with the VDOT functional classification, number of lanes, average daily traffic (ADT), and speed limit.

Intersection Level of Service

**Tables 3.1-3A and 3.1-3B** show the 58 intersections (39 signalized, 19 unsignalized) that were studied as part of the traffic analysis for existing conditions. As shown in the table, 15 intersections currently operate at LOS E or F during the morning or afternoon peak hours. They are:

- ~ Princess Anne Road and Freight Lane
- ~ Witchduck Road and Cleveland Street
- ~ Witchduck Road and I-264 westbound on-ramp
- ~ Witchduck Road and Mac Street

Table 3.1-2 | Existing Roadway Characteristics

Roadway	VDOT Classification <sup>1</sup>	Number of Lanes	Speed Limit <sup>2</sup>	Weekday ADT <sup>3</sup>	Weekend ADT <sup>3</sup>	Count Year
I-264*	Interstate Highway	8	55	90,000	N/A	2012
Newtown Road	Local	2	35	11,900	9,500	2013
Princess Anne Road*	Minor Arterial	4	35	30,500	22,000	2012
Greenwich Road	Collector	2	35	7,100	3,100	2013
Witchduck Road, N.*	Minor Arterial	4	35	53,500	37,500	2012
Euclid Road	Collector	2	35	6,100	3,900	2013
Independence Boulevard, N.*	Principal Arterial	8	45	62,500	50,000	2012
Independence Boulevard, S.*	Principal Arterial	8	45	75,500	N/A	2012
Virginia Beach Boulevard*	Principal Arterial	8	45	45,000	42,000	2011/2012
Fir Avenue	Local	2	25	820	710	2013
Thalia Road	Local	2	25	2,800	1,950	2013
Budding Avenue	Local	2	25	560	490	2013
Kentucky Avenue	Local	2	25	6,000	5,300	2013
Lynn Shores Drive	Local	4	25	4,100	3,500	2013
Rosemont Road	Minor Arterial	4	35	35,000	N/A	2013
S. Plaza Trail	Minor Arterial	4	25	14,300	13,800	2013
N. Lynnhaven Road	Local	2	35	11,300	8,500	2013
Lynnhaven Parkway*	Minor Arterial	4	35	22,000	25,500	2011/2012
London Bridge Road*	Minor Arterial	6	45	39,000	28,000	2012/2013
Potters Road*	Collector	2	45	4,000	3,000	2013
Air Station Drive	Local	2	25	850	710	2013
First Colonial Road, S.*	Collector	2	35	4,500	3,000	2013
Laskin Road*	Principal Arterial	4	45	31,000	29,000	2013
Birdneck Road, N.*	Minor Arterial	4	35	31,000	29,000	2013
19 <sup>th</sup> Street*	Collector	4	25	5,000	8,000	2012/2013

Source: Fitzgerald & Halliday, 2014

<sup>1</sup>2005 VDOT Functional Classification Maps

<sup>2</sup>Posted speed limit sign within the immediate study area

<sup>3</sup>Does not reflect seasonal adjustments

\*City of Virginia Beach ATR Count

- ~ Independence Boulevard and Columbus Street (pm only)
- ~ Independence Boulevard and Bonney Road/Euclid Road
- ~ Lynn Shores Drive and Bonney Road (pm only)
- ~ Virginia Beach Boulevard and Rosemont Road
- ~ Lynnhaven Parkway and Southern Boulevard
- ~ Virginia Beach Boulevard and Great Neck Road/London Bridge Road
- ~ Laskin Road and Phillip Avenue
- ~ Laskin Road and Winwood Drive
- ~ Laskin Road and Linkhorn Bay Condominium Entrance
- ~ Birdneck Road and Maximus Square (pm only)
- ~ Birdneck Road and Old Virginia Beach Road

The remaining intersections evaluated for this DEIS currently operate at LOS D or better. In general, traffic flows reasonably well given the city’s highly developed suburban character. Heavy traffic demand can be associated with arterials paralleling I-264, minor side streets with low traffic volumes intersecting a major roadway with high traffic volumes, and freeway interchange access within the VBTES Corridor contributing to congestion at nearby intersections.

3.1.4 Environmental Impacts

This section presents the impacts of the No Build and build alternatives at intersections in the VBTES Corridor based on projected 2034 traffic volumes. For planning purposes, a 1.05% per year growth rate was applied to the existing (2013) traffic volumes to establish forecast year (2034) conditions. This rate was derived using data from the Hampton Roads Regional Travel Demand Model and discussions with the City of Virginia Beach Public Works/Traffic Engineering Division. The same growth rate was applied for both No Build and build alternatives.

Table 3.1-3A| AM Peak Intersection Level of Service

PM Peak Intersection Level of Service								
ALTERNATIVE				Intersection	Control Type <sup>1</sup>	Existing	2034 No Build	2034 Build
1A	1B	2	3			PM	PM	PM
•	•	•	•	Princess Anne Road and Newtown Road	Signal	C	D	D
•	•	•	•	Princess Anne Road and Freight Lane	SSSC Signal <sup>2</sup>	F	F	A
•	•	•	•	Southern Boulevard and Freight Lane	SSSC	A	A	A
•	•	•	•	Witchduck Road and Cleveland Street	Signal	E	D	D
•	•	•	•	Witchduck Road and Southern Boulevard/I-264 WB On-Ramp	SSSC	F	B	B
•	•	•	•	Witchduck Road and Mac Street	SSSC N/A <sup>3</sup>	F	N/A <sup>3</sup>	N/A <sup>3</sup>
•	•	•	•	Southern Boulevard and Euclid Road/Opal Avenue	SSSC	C	D	D
•	•	•	•	Columbus Street and Kellam Road	Signal	A	B	B
•	•	•	•	Independence Boulevard and Columbus Street	Signal	C	C	C
•	•	•	•	Independence Boulevard and Bonney Road/Euclid Road	Signal	E	F	F
•	•	•	•	Market Street and Columbus Street	Signal	B	B	B
•	•	•	•	Columbus Street and Constitution Drive	Signal	C	C	C
•	•	•	•	Lynn Shores Drive and Virginia Beach Boulevard	Signal	A	A	A
	•	•	•	Lynn Shores Drive and Bonney Road	SSSC Signal <sup>2</sup>	D	F	B
	•	•	•	Virginia Beach Boulevard and Rosemont Road	Signal	E	F	F
	•	•	•	Rosemont Road and Bonney Road/I-264 WB Off-Ramp	Signal	C	E	E
	•	•	•	Rosemont Road and I-264 EB Ramps	Signal	C	C	C
		•	•	North Plaza Trail and Virginia Beach Boulevard	Signal	D	D	D
		•	•	N. Lynnhaven Road and Southern Boulevard	SSSC	B	C	C
		•	•	Lynnhaven Parkway and Southern Boulevard	SSSC	E	F	F
		•	•	Lynnhaven Parkway and Lynnhaven Road/I-264 WB Off-Ramp	Signal	C	C	C
		•		Potters Road and Air Station Drive	SSSC	A	A	A
		•		First Colonial Road and Oceana Boulevard	Signal	B	C	C
		•		Birdneck Road and Norfolk Avenue/Southern Boulevard	Signal	C	E	D
		•		Birdneck Road and Burford Avenue	Signal	A	A	B
		•		Birdneck Road and Hope Avenue	SSSC Signal <sup>2</sup>	C	C	A
		•		Birdneck Road and Virginia Beach Boulevard/17th Street	Signal	C	C	D
		•		Virginia Beach Boulevard and Jefferson Avenue	SSSC Signal <sup>2</sup>	B	C	B

Source: Fitzgerald & Halliday, 2014

Key:

	Intersection at LOS E
	Intersection at LOS F

<sup>1</sup>SSSC: Side street stop controlled

<sup>2</sup>Side street stop controlled in existing condition and 2034 No Build. Proposed new signal in build condition.

<sup>3</sup>Side street stop controlled in existing condition. Intersection of Witchduck Road and Mac Street to be closed under all alternatives as part of Witchduck Road widening project

<sup>4</sup>Proposed new intersection for LRT Alternative 2 only.

PM Peak Intersection Level of Service								
ALTERNATIVE				Intersection	Control Type <sup>1</sup>	Existing	2034 No Build	2034 Build
1A	1B	2	3			PM	PM	PM
			•	Virginia Beach Boulevard and Hutton Lane/Parker Lane	Signal	B	C	C
			•	Virginia Beach Boulevard and Byrd Lane	Signal	B	B	B
			•	Virginia Beach Boulevard and Great Neck Rd./London Bridge Rd.	Signal	F	F	F
			•	Laskin Road and Phillip Avenue	SSSC Signal <sup>2</sup>	F	F	B
			•	Laskin Road and Regency Hilltop Shopping Center	Signal	A	A	A
			•	Laskin Road and Regency Drive	Signal	C	C	C
			•	Laskin Road and Republic Road	Signal	B	B	B
			•	Laskin Road and Hilltop Plaza Shopping Center	Signal	A	A	A
			•	Laskin Road and First Colonial Road	Signal	D	D	D
			•	First Colonial Road and Donna Boulevard	Signal	B	C	C
			•	Laskin Road and Hilltop North Shopping Center	Signal	B	B	B
			•	Laskin Road and Hilltop East Shopping Center	Signal	A	A	A
			•	Laskin Road and Winwood Drive	SSSC Signal <sup>2</sup>	E	F	B
			•	Laskin Road and Linkhorn Bay Condominium Entrance	SSSC Signal <sup>2</sup>	F	F	C
			•	Laskin Road and Cardinal Road	Signal	B	B	B
			•	Laskin Road and Birdneck Road	Signal	C	C	D
			•	Laskin Road and Oriole Drive	Signal	B	B	B
			•	Birdneck Road and 24th Street	Signal	A	A	B
			•	Birdneck Road and Waterfront Drive	Signal	B	B	B
			•	Birdneck Road and Maximus Square	SSSC Signal <sup>2</sup>	D	F	A
			•	Birdneck Road and Old Virginia Beach Road	SSSC Signal <sup>2</sup>	F	F	A
			•	Birdneck Road and I-264 EB Off-Ramp	Signal	A	B	B
			•	Birdneck Road and 19th Street/Americus Avenue	Signal	A	A	C
			•	19th Street and West Convention Center Parking Lot Entrance	SSSC Signal <sup>2</sup>	B	B	B
			•	19th Street and East Convention Center Parking Lot Entrance	Signal	B	B	B
			•	19th Street at LRT guideway (in front of Convention Center) <sup>4</sup>	N/A Signal <sup>4</sup>	N/A <sup>4</sup>	N/A <sup>4</sup>	C
			•	19th Street and Parks Avenue	Signal	A	A	B
			•	19th Street and Cypress Avenue	SSSC Signal <sup>2</sup>	B	B	B
			•	19th Street and Mediterranean Avenue	SSSC Signal <sup>2</sup>	B	B	B
			•	19th Street and Baltic Avenue	Signal	B	B	B
			•	19th Street and Arctic Avenue	Signal	B	B	C

Table 3.1-3B | PM Peak Intersection Level of Service

PM Peak Intersection Level of Service								
ALTERNATIVE				Intersection	Control Type <sup>1</sup>	Existing	2034 No Build	2034 Build
1A	1B	2	3			PM	PM	PM
•	•	•	•	Princess Anne Road and Newtown Road	Signal	D	F	F
•	•	•	•	Princess Anne Road and Freight Lane	SSSC Signal <sup>2</sup>	F	F	B
•	•	•	•	Southern Boulevard and Freight Lane	SSSC	B	B	B
•	•	•	•	Witchduck Road and Cleveland Street	Signal	F	D	D
•	•	•	•	Witchduck Road and Southern Boulevard/I-264 WB On-Ramp	SSSC	F	B	B
•	•	•	•	Witchduck Road and Mac Street	SSSC N/A <sup>3</sup>	F	N/A <sup>3</sup>	N/A <sup>3</sup>
•	•	•	•	Southern Boulevard and Euclid Road/Opal Avenue	SSSC	C	D	D
•	•	•	•	Columbus Street and Kellam Road	Signal	B	C	C
•	•	•	•	Independence Boulevard and Columbus Street	Signal	E	F	F
•	•	•	•	Independence Boulevard and Bonney Road/Euclid Road	Signal	F	F	F
•	•	•	•	Market Street and Columbus Street	Signal	B	C	C
•	•	•	•	Columbus Street and Constitution Drive	Signal	C	C	C
•	•	•	•	Lynn Shores Drive and Virginia Beach Boulevard	Signal	B	B	B
	•	•	•	Lynn Shores Drive and Bonney Road	SSSC Signal <sup>2</sup>	F	F	C
	•	•	•	Virginia Beach Boulevard and Rosemont Road	Signal	E	F	F
	•	•	•	Rosemont Road and Bonney Road/I-264 WB Off-Ramp	Signal	C	D	D
	•	•	•	Rosemont Road and I-264 EB Ramps	Signal	C	C	C
		•	•	North Plaza Trail and Virginia Beach Boulevard	Signal	D	E	E
		•	•	N. Lynnhaven Road and Southern Boulevard	SSSC	C	D	D
		•	•	Lynnhaven Parkway and Southern Boulevard	SSSC	F	F	F
		•	•	Lynnhaven Parkway and Lynnhaven Road/I-264 WB Off-Ramp	Signal	C	D	D
		•		Potters Road and Air Station Drive	SSSC	B	B	B
		•		First Colonial Road and Oceana Boulevard	Signal	C	C	C
		•		Birdneck Road and Norfolk Avenue/Southern Boulevard	Signal	C	C	D
		•		Birdneck Road and Burford Avenue	Signal	B	B	A
		•		Birdneck Road and Hope Avenue	SSSC Signal <sup>2</sup>	C	C	A
		•		Birdneck Road and Virginia Beach Boulevard/17th Street	Signal	C	D	D
		•		Virginia Beach Boulevard and Jefferson Avenue	SSSC Signal <sup>2</sup>	D	E	B

Source: Fitzgerald & Halliday, 2014

Key:

	Intersection at LOS E
	Intersection at LOS F

<sup>1</sup>SSSC: Side street stop controlled

<sup>2</sup>Side street stop controlled in existing condition and 2034 No Build. Proposed new signal in build condition.

<sup>3</sup>Side street stop controlled in existing condition. Intersection of Witchduck Road and Mac Street to be closed under all alternatives as part of Witchduck Road widening project

<sup>4</sup>Proposed new intersection for LRT Alternative 2 only.

PM Peak Intersection Level of Service								
ALTERNATIVE				Intersection	Control Type <sup>1</sup>	Existing	2034 No Build	2034 Build
1A	1B	2	3			PM	PM	PM
			•	Virginia Beach Boulevard and Hutton Lane/Parker Lane	Signal	B	C	C
			•	Virginia Beach Boulevard and Byrd Lane	Signal	C	C	C
			•	Virginia Beach Boulevard and Great Neck Rd./London Bridge Rd.	Signal	F	F	F
			•	Laskin Road and Phillip Avenue	SSSC Signal <sup>2</sup>	F	F	B
			•	Laskin Road and Regency Hilltop Shopping Center	Signal	A	B	B
			•	Laskin Road and Regency Drive	Signal	C	D	D
			•	Laskin Road and Republic Road	Signal	C	C	C
			•	Laskin Road and Hilltop Plaza Shopping Center	Signal	B	B	B
			•	Laskin Road and First Colonial Road	Signal	D	D	D
			•	First Colonial Road and Donna Boulevard	Signal	C	D	D
			•	Laskin Road and Hilltop North Shopping Center	Signal	C	C	C
			•	Laskin Road and Hilltop East Shopping Center	Signal	B	A	B
			•	Laskin Road and Winwood Drive	SSSC Signal <sup>2</sup>	F	F	B
			•	Laskin Road and Linkhorn Bay Condominium Entrance	SSSC Signal <sup>2</sup>	F	F	B
			•	Laskin Road and Cardinal Road	Signal	A	A	B
			•	Laskin Road and Birdneck Road	Signal	C	C	D
			•	Laskin Road and Oriole Drive	Signal	B	B	A
			•	Birdneck Road and 24th Street	Signal	A	A	B
			•	Birdneck Road and Waterfront Drive	Signal	A	B	B
			•	Birdneck Road and Maximus Square	SSSC Signal <sup>2</sup>	F	F	A
			•	Birdneck Road and Old Virginia Beach Road	SSSC Signal <sup>2</sup>	F	F	B
			•	Birdneck Road and I-264 EB Off-Ramp	Signal	B	B	B
			•	Birdneck Road and 19th Street/Americus Avenue	Signal	B	B	C
			•	19th Street and West Convention Center Parking Lot Entrance	SSSC Signal <sup>2</sup>	B	B	A
			•	19th Street and East Convention Center Parking Lot Entrance	Signal	B	B	B
		•		19th Street at LRT guideway (in front of Convention Center) <sup>4</sup>	N/A Signal <sup>4</sup>	N/A <sup>4</sup>	N/A <sup>4</sup>	C
		•	•	19th Street and Parks Avenue	Signal	A	A	B
		•	•	19th Street and Cypress Avenue	SSSC Signal <sup>2</sup>	B	B	B
		•	•	19th Street and Mediterranean Avenue	SSSC Signal <sup>2</sup>	C	C	B
		•	•	19th Street and Baltic Avenue	Signal	B	B	C
		•	•	19th Street and Arctic Avenue	Signal	A	B	C

No Build Alternative

No Build conditions represent traffic from existing conditions, known planned improvements, and the application of the growth rate previously described. The estimated 2034 average daily traffic (ADT) of the VBTES Corridor’s key roads, including current VDOT functional classification, number of lanes, and speed limits, are shown in **Table 3.1-4**.

Results from the 2034 No Build analysis, shown in **Tables 3.1-3A and 3.1-3B**, indicate that seventeen of the study area intersections would operate at LOS E or F during the morning or afternoon peak hours. Of these intersections, twelve would have a decreased level of service compared to the existing (2013) conditions. They are:

- ~ Princess Anne Road and Newtown Road (pm only)
- ~ Independence Boulevard and Columbus Street (pm only)
- ~ Independence Boulevard and Bonney Road/Euclid Road (am only)
- ~ Lynn Shores Drive and Bonney Road (am only)
- ~ Virginia Beach Boulevard and Rosemont Road
- ~ Rosemont Road and Bonney Road/I-264 westbound off-ramp (am only)
- ~ North Plaza Trail and Virginia Beach Boulevard (pm only)
- ~ Lynnhaven Parkway and Southern Boulevard (am only)
- ~ Birdneck Road and Norfolk Avenue/Southern Boulevard (am only)
- ~ Virginia Beach Boulevard and Jefferson Avenue (pm only)
- ~ Laskin Road and Winwood Drive (am only)
- ~ Birdneck Road and Maximus Square (am only)

Planned improvements on Witchduck Road will cause two intersections that currently (2013) operate at LOS E or F to operate under acceptable conditions (LOS D or better) in the forecast year (2034):

Table 3.1-4 | No Build 2034 Roadway Characteristics

Roadway	VDOT Classification <sup>1</sup>	Number of Lanes	Speed Limit <sup>2</sup>	Weekday ADT <sup>3</sup>	Weekend ADT <sup>3</sup>
I-264*	Interstate Highway	8	55	112,500	N/A
Newtown Road	Local	2	35	15,000	12,000
Princess Anne Road*	Minor Arterial	4	35	38,000	27,500
Greenwich Road	Collector	2	35	9,000	4,000
Witchduck Road, N.*	Minor Arterial	6	35	67,000	47,000
Euclid Road	Collector	2	35	7,500	5,000
Independence Boulevard, N.*	Principal Arterial	8	45	78,000	62,500
Independence Boulevard, S.*	Principal Arterial	8	45	94,000	N/A
Virginia Beach Boulevard*	Principal Arterial	8	45	56,000	52,500
Fir Avenue	Local	2	25	1,000	1,000
Thalia Road	Local	2	25	3,500	2,500
Budding Avenue	Local	2	25	750	500
Kentucky Avenue	Local	2	25	7,500	6,500
Lynn Shores Drive	Local	4	25	5,000	4,500
Rosemont Road	Minor Arterial	6	35	44,000	N/A
S. Plaza Trail	Minor Arterial	4	25	18,000	17,500
N. Lynnhaven Road	Local	2	35	14,000	10,500
Lynnhaven Parkway*	Minor Arterial	4	35	27,500	32,000
London Bridge Road*	Minor Arterial	6	45	49,000	35,000
Potters Road*	Collector	2	45	5,000	4,000
Air Station Drive	Local	2	25	1,000	1,000
First Colonial Road, S.*	Collector	2	35	5,500	4,000
Laskin Road*	Principal Arterial	8	45	39,000	36,000
Birdneck Road, N.*	Minor Arterial	4	35	39,000	36,000
19 <sup>th</sup> Street*	Collector	4	25	6,000	10,000

Source: Fitzgerald & Halliday, 2014

<sup>1</sup>2005 VDOT Functional Classification Maps

<sup>2</sup>Posted speed limit sign within the immediate study area

<sup>3</sup>Does not reflect seasonal adjustments

\*Derived from City of Virginia Beach existing Automatic Traffic Recorder Count

- ~ Witchduck Road and I-264 westbound on-ramp/realigned Southern Boulevard
- ~ Witchduck Road and Cleveland Street

The intersection of Witchduck Road and Mac Street would be closed as part of the planned improvements. The remaining VBTES Corridor intersections operate at LOS D or better under No Build conditions.

LRT Build Alternatives

**Table 3.1-5** summarizes the physical modifications associated with each LRT alternative required to improve pedestrian and vehicle safety, improve the speed and reliability of the transit service, and/or minimize impacts to vehicular traffic. These improvements are detailed in the descriptions of each build alternative in **Chapter 2**, and they have been included in the build conditions for the traffic analysis. See **Figure 3.1-1** for locations of improvements.

ALTERNATIVE 1A: Town Center Alternative

As shown in **Tables 3.1-3A and 3.1-3B**, under Alternative 1A three of the study area intersections would operate at LOS E or F during the morning or afternoon peak hours. These intersections are:

- ~ Princess Anne Road and Newtown Road (pm only)
- ~ Independence Boulevard and Columbus Street (pm only)
- ~ Independence Boulevard and Bonney Road/Euclid Road (am and pm)

Traffic operations at the intersection of Princess Anne Road and Freight Lane would improve because of a new traffic signal proposed at this location. In general, the traffic operations under Alternative 1A would be similar to the No Build alternative. No intersections under Alternative 1A in the VBTES Corridor would have a lower LOS compared to the No Build alternative.

ALTERNATIVE 1B: Rosemont Alternative

As shown in **Tables 3.1-3A and 3.1-3B**, under Alternative 1B five of the study area intersections would operate at LOS E or F during the morning or afternoon peak hours. These intersections are:

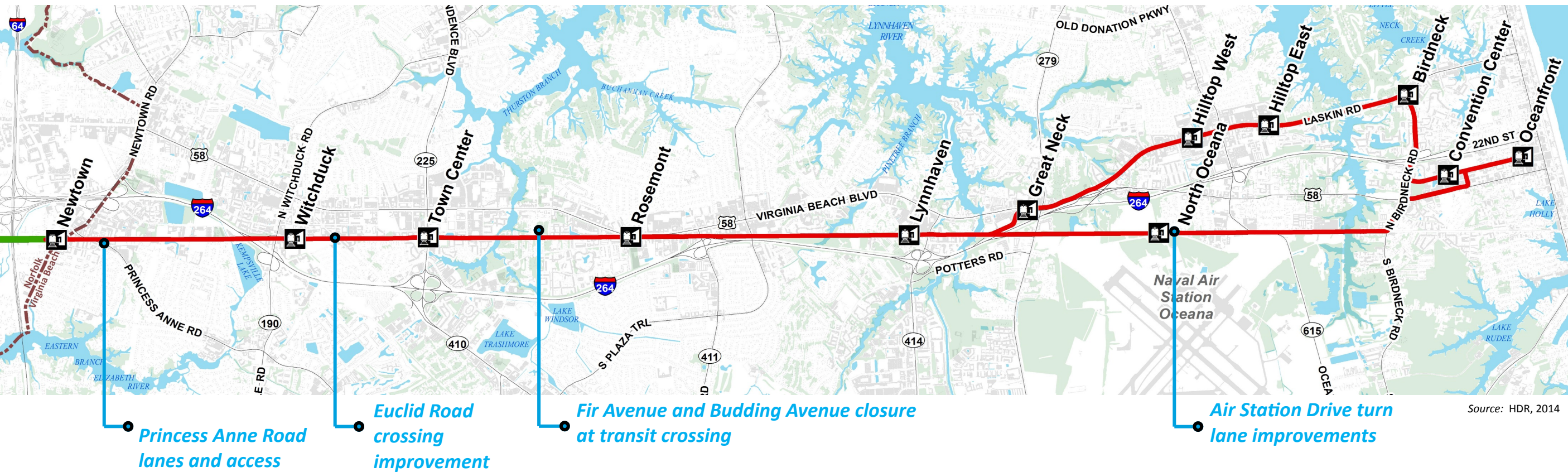
Table 3.1-5 | Roadway Modifications for Build Alternatives

Location	ALTERNATIVES				Modification
	1A	1B	2	3	
~ Princess Anne Road crossing	●	●	●	●	Close southbound left turn lane on Princess Anne Road into driveway. Relocate driveway to west end of Southern Boulevard.
~ Princess Anne Road/Freight Lane intersection	●	●	●	●	Install new traffic signal. Add right turn lane on northbound Princess Anne Road.
~ S. Lowther Drive crossing	●	●	●	●	Crossing to be closed. Relocate access to Dominion Virginia Power substation via Southern Boulevard.
~ Witchduck Road crossing	●	●	●	●	Grade separated structure over Witchduck Road.
~ Euclid Road/Southern Boulevard/Opal Avenue intersection	●	●	●	●	Realign intersection to increase the distance between the crossing and the intersection.
~ Euclid Road/Holland Drive intersection	●	●	●	●	Realign intersection to increase the distance between the crossing and the intersection.
~ Independence Boulevard crossing	●	●	●	●	Grade separated structure over Independence Boulevard.
~ Market Street crossing	●	●	●	●	Grade separated structure over Market Street.
~ Fir Avenue crossing		●	●	●	Crossing to be closed. Fir Avenue south of tracks to become a dead end street. North of tracks, Fir Avenue to end at Southern Boulevard.
~ Budding Avenue crossing		●	●	●	Crossing to be closed. Budding Avenue south of tracks to become a dead end street. North of tracks, Budding Avenue to end at Southern Boulevard.
~ Lynn Shores Drive/Bonney Road intersection		●	●	●	Install new traffic signal.
~ Rosemont Road crossing			●	●	Grade separated structure over Rosemont Road.
~ North Plaza Trail, between former NSRR ROW and Virginia Beach Boulevard			●	●	Extend median to crossing. Reconfigure access to/from shopping centers north of former NSRR ROW.
~ Lynnhaven Parkway crossing			●	●	Grade separated structure over Lynnhaven Parkway
~ London Bridge Road crossing			●		Grade separated structure over London Bridge Road.
~ London Bridge Road crossing				LRT	Modify traffic signal for non-revenue light rail vehicle access to/from LRT VSMF.
~ Potters Road/Air Station Drive intersection			●		Add eastbound left turn lane and westbound right turn lane on Potters Road.
~ Birdneck Road, between Norfolk Avenue/Southern Boulevard and Virginia Beach Boulevard			LRT		Median breaks to be closed except at intersections with traffic signals.
~ Birdneck Road/Hope Avenue intersection			LRT		Install new traffic signal.
~ Washington Avenue, between Virginia Beach Boulevard (17 <sup>th</sup> Street) and 19 <sup>th</sup> Street			LRT		Street to be closed. 18 <sup>th</sup> Street and Monroe Avenue to become dead end streets. Access to parking areas to be relocated.

Location (continued)	ALTERNATIVES				Modification
	1A	1B	2	3	
~ 19 <sup>th</sup> Street/Washington Avenue (LRT tracks) intersection			LRT		Install new traffic signal.
~ 19 <sup>th</sup> Street/Cypress Avenue intersection			LRT	LRT	Install new traffic signal.
~ 19 <sup>th</sup> Street/Mediterranean Avenue intersection			LRT	LRT	Install new traffic signal.
~ Virginia Beach Boulevard crossing (west of Great Neck Road)				LRT	Grade separated structure over Virginia Beach Boulevard.
~ Great Neck Road crossing				LRT	Grade separated structure over Great Neck Road.
~ Westbound Laskin Road crossing				LRT	Grade separated structure over westbound Laskin Road.
~ I-264 westbound on-ramp crossing (from Laskin Road)				LRT	Grade separated structure over on-ramp.
~ Laskin Road, from Phillip Avenue to Birdneck Road				●	Typical section changes to 3 lanes in each direction plus turn lanes, and eliminate service roads. Median breaks to be closed except at intersections with traffic signals.
~ Laskin Road/Phillip Avenue intersection				●	Install new traffic signal.
~ Laskin Road/First Colonial Road intersection				●	Grade separated structure for LRT or BRT over First Colonial Road. Roadway intersection to remain at grade.
~ Laskin Road/Winwood Drive intersection				●	Install new traffic signal.
~ Laskin Road/Linkhorn Bay Condominium entrance intersection				●	Install new traffic signal.
~ Birdneck Road, from Laskin Road to 19 <sup>th</sup> Street				LRT	Median breaks to be closed except at intersections with traffic signals.
~ Birdneck Road/24 <sup>th</sup> Street/Bluebird Drive intersection				LRT	Bluebird Drive to be realigned to 24 <sup>th</sup> Street intersection. Existing Bluebird Drive to become dead end at Birdneck Road.
~ Birdneck Road/Maximus Square/Shopping center entrance intersection				LRT	Install new traffic signal.
~ Birdneck Road/Old Virginia Beach Road intersection				LRT	Install new traffic signal.
~ Birdneck Road under I-264				LRT	Relocate northbound lane to I-264 westbound on-ramp behind bridge piers.
~ 19 <sup>th</sup> Street, from Birdneck Road to Parks Avenue				LRT	Reduce number of lanes from 2 in each direction to 1 in each direction. LRT would be in exclusive lanes in the median of 19 <sup>th</sup> Street.
~ 19 <sup>th</sup> Street/Convention Center parking lot entrance (west)				LRT	Install new traffic signal.
~ 19 <sup>th</sup> Street/Jefferson Avenue (east Convention Center parking lot entrance)				LRT	Install new traffic signal.

Source: Fitzgerald &amp; Halliday, 2014

Figure 3.1-1 | Major Roadway Improvements Associated with the Build Alternatives



- ~ Princess Anne Road and Newtown Road (pm only)
- ~ Independence Boulevard and Columbus Street (pm only)
- ~ Independence Boulevard and Bonney Road/Euclid Road (am and pm)
- ~ Virginia Beach Boulevard and Rosemont Road (am and pm)
- ~ Rosemont Road and Bonney Road/I-264 westbound off-ramp (am only)

Two intersections (Princess Anne Road at Freight Lane and Lynn Shores Drive at Bonney Road) would have improved levels of service because of new traffic control devices required to safely operate Alternative 1B. In general, the traffic operations under Alternative 1B are similar to the No Build alternative. The proposed closure of the at-grade

crossings at Fir Avenue and Budding Avenue would result in changes to traffic patterns in the surrounding neighborhood, including potentially diverting traffic to Thalia Road and other streets with crossings. Determination of the impacts of those closures will require additional analysis during the next phase of design. However, no intersections in the VBTES Corridor would have a lower LOS under Alternative 1B compared to the No Build alternative.

**ALTERNATIVE 2: NSRR Alternative**

As shown in **Tables 3.1-3A and 3.1-3B**, seven intersections would operate at LOS E or F during the morning or afternoon peak hours. These intersections are:

- ~ Princess Anne Road and Newtown Road (pm only)
- ~ Independence Boulevard and Columbus Street (pm only)

- ~ Independence Boulevard and Bonney Road/Euclid Road (am and pm)
- ~ Virginia Beach Boulevard and Rosemont Road (am and pm)
- ~ Rosemont Road and Bonney Road/I-264 westbound off-ramp (am only)
- ~ North Plaza Trail and Virginia Beach Boulevard (pm only)
- ~ Lynnhaven Parkway and Southern Boulevard (am and pm)

In general, the traffic operations under Alternative 2 would be similar to the No Build alternative. Seven intersections would have improved level of service because of new traffic control devices, modifications to the roadway, or changes to signal operations required to safely operate the build

alternative. The intersections at Birdneck Road and Norfolk Avenue/Southern Boulevard and Birdneck Road and Virginia Beach Boulevard would experience an increase in delay due to the changes in signal phasing required to accommodate transit operations and the transitions to and from the median of Birdneck Road. Both of these intersections would be expected to operate at LOS D.

**ALTERNATIVE 3: Hilltop Alternative**

As shown in **Tables 3.1-3A and 3.1-3B**, eight intersections would operate at LOS E or F during the morning or afternoon peak hours under Alternative 3. These intersections are:

- ~ Princess Anne Road and Newtown Road (pm only)
- ~ Independence Boulevard and Columbus Street (pm only)

- ~ Independence Boulevard and Bonney Road/Euclid Road (am and pm)
- ~ Virginia Beach Boulevard and Rosemont Road (am and pm)
- ~ Rosemont Road and Bonney Road/I-264 westbound off-ramp (am only)
- ~ North Plaza Trail and Virginia Beach Boulevard (pm only)
- ~ Lynnhaven Parkway and Southern Boulevard (am and pm)
- ~ Virginia Beach Boulevard and Great Neck Road/London Bridge Road (am and pm)

As of 2013, Laskin Road has four general traffic lanes (two per direction) from Birdneck Road to Republic Road. In addition, Laskin Road has parallel bi-directional frontage roads along most of its length, although they are discontinuous at major intersections. The No Build alternative includes the removal of the frontage road system and addition of two mainline lanes in each direction for a total of eight in this area. Alternative 3 would reduce the number of general traffic lanes from the originally proposed eight lanes to six lanes between Republic Road and Birdneck Road to accommodate the transit guideway. To assess the operations of the lane reduction, a roadway analysis was conducted to compare Alternative 3 to the No Build alternative. The analysis showed that the Laskin Road corridor would operate efficiently as a six lane road under Alternative 3, similarly to the No Build alternative. The forecasted traffic could be accommodated by either the No Build alternative or Alternative 3.

In general, the traffic operations under Alternative 3 would be similar to the No Build alternative. Ten intersections would have improved level of service because of new traffic control devices, modifications to the roadway, or changes to signal operations required to safely operate the build alternative. The intersection of Laskin Road and Birdneck Road would experience an increase in delay due to changes in signal phasing required to accommodate transit operations resulting in a LOS D.

### BRT Build Alternatives

Where the BRT versions of the build alternatives operate in exclusive guideways, they would require similar transportation improvements and have similar operational characteristics (frequency and speed) as the LRT alternatives. As such, the impacts of the BRT Alternative 1A would be the same as the LRT Alternative 1A, the BRT Alternative 1B would be the same as the LRT Alternative 1B, the BRT Alternative 2 would be the same as the LRT Alternative 2 west of Birdneck Road, and the BRT Alternative 3 would be the same as the LRT Alternative 3 in the former NSRR ROW west of Parker Lane and on Laskin Road between Phillip Avenue and Birdneck Road.

In areas where the BRT alternatives would operate in mixed traffic (Birdneck Road and 19<sup>th</sup> Street for Alternative 2 and portions of Virginia Beach Boulevard, Laskin Road, Birdneck Road, and 19<sup>th</sup> Street for Alternative 3), the transit vehicles would not receive any traffic signal priority or other preferential treatment. The BRT vehicles would be expected to adhere to traffic regulations, existing traffic signals and other traffic control devices. As a result, the impacts of the BRT at intersections where it operates in mixed traffic would be identical to the No Build alternative.

### 3.1.5 Construction Impacts

Potential impacts to existing roads that could occur during construction include short-term lane closures, detours, reductions in lane widths, or reduced speeds through work zones. Installation of at-grade crossings and grade separation structures in particular may require extended lane closures or detours to perform the work safely. Installation of bridges and viaducts for grade separated crossings would require partial or complete closures of the following arterial roadways while those structures are being constructed:

- ~ Witchduck Road (Alternatives 1A, 1B, 2, and 3)
- ~ Independence Boulevard (Alternatives 1A, 1B, 2, and 3)
- ~ Rosemont Road (Alternatives 2 and 3)
- ~ Lynnhaven Parkway (Alternatives 2 and 3)
- ~ London Bridge Road (Alternative 2)

- ~ Virginia Beach Boulevard (Alternative 3)
- ~ Great Neck Road (Alternative 3)
- ~ Laskin Road westbound (Alternative 3)
- ~ I-264 westbound on-ramp from Laskin Road (Alternative 3)
- ~ First Colonial Road (Alternative 3)

A maintenance of traffic plan will be developed during final design to address these issues and identify strategies for minimization and mitigation of impacts. Any changes to traffic patterns would be coordinated with the City of Virginia Beach, and public outreach efforts during construction would include announcements regarding construction activities that would affect traffic.

### 3.1.6 Indirect Effects

Potential development and redevelopment in the VBTES Corridor and around station sites could increase localized traffic volumes. These activities, however, would be subject to review and design approval by the City of Virginia Beach to be consistent with planned Strategic Growth Area development. Therefore, indirect impacts to the highway and roadway system would be associated with development controlled by City zoning ordinances, and the level of impacts would be related to the type and degree of future growth.

### 3.1.7 Avoidance, Minimization, and Mitigation

#### LRT Build Alternatives

The proposed LRT build alternatives traverse through an area that is already congested during peak periods. Transportation improvements such as grade separated crossings, signal installations, signal optimization, and roadway and access modifications as part of the build alternatives would accommodate safe and efficient LRT operations and transitions. LOS E and F operations are already occurring at a number of key intersections along the VBTES Corridor. Typically, these intersections are expected to continue to operate at unacceptable levels of service (LOS E or LOS F) in 2034 under the No Build and build

alternatives. While the addition of new signals and modifications to signal operations, roadways, and access would increase delay in the VBTES Corridor to accommodate safe and efficient LRT operations and transitions, traffic congestion and long delays at the intersections are attributed to traffic demand and growth from background development. Traffic signal operations will be refined during the next phases of design which may improve the efficiency of traffic flow at intersections to offset delays that may be caused by adding LRT operations.

### BRT Build Alternatives

The potential for traffic impacts associated with the BRT Alternatives would be similar to the LRT Alternatives discussed above because it is assumed that a BRT system would operate similar to the LRT. Thus, the mitigation for the BRT Alternatives would be the same as those described for the LRT Alternatives.

## 3.2 Transit Network and Transit Facilities

This section provides a discussion of the public transit presently serving the VBTES Corridor and the planned transit improvements that may affect the VBTES Corridor. A more detailed discussion of the public transportation impacts is provided in the *Travel Forecast Results Report, Appendix K* of this DEIS.

### 3.2.1 Legal and Regulatory Context

Public transportation in Virginia Beach, and five other cities (Norfolk, Chesapeake, Hampton, Newport News, and Portsmouth) in Hampton Roads, is operated by Hampton Roads Transit. Hampton Roads Transit is the operating arm of the Transportation District Commission of Hampton Roads (TDCHR). The Commission consists of 13 members - one elected official and one citizen representative from each of the six cities served by Hampton Roads Transit and the chairman of the Commonwealth Transportation Board (CTB) or his or her designee. The TDCHR is responsible for setting overall policy and maintaining accountability of the agency's actions.



### 3.2.2 Methodology

The build alternatives could affect public transportation in the VBTES Corridor in two primary ways: 1) the implementation of a new fixed guideway service and 2) the modification of the existing transit services in the VBTES Corridor to accommodate the new fixed guideway.

The primary measure of effectiveness for transit impacts used for this DEIS is the change in transit ridership. To find this, ridership demand for each of the build alternatives was forecasted for the year 2034 using a set of computer-based supply and demand models. These models account for future population growth, projected employment, socio-economic characteristics of residents, parking costs, travel time, and cost characteristics of the competing highway and transit modes of travel.

The model simulates travel on the roadway network and transit system in the region, including local bus service, MAX, and The Tide. The model contains information on service frequencies, routes, intermodal connections, travel time, and fares for all transit services. The highway system includes all freeways and principal arterial roadways, as well as minor arterial and local roadways. The model outputs contain detailed information related to the transportation system in the forecast year. In addition to information about the proposed transit service, the model can provide data regarding highway traffic volumes, travel speeds, vehicle miles traveled, and average travel times on roadway segments.

The forecast year (2034) transportation network was developed by updating the existing transportation network with roadway improvements that are included in the HRTPO *Long Range Transportation Plan*. The transit component of the computer model was included by providing necessary information regarding the operational characteristics of the proposed LRT or BRT service for each build alternative. The model includes the available modes of access at each station, peak and off-peak headways, vehicle dwell times at each station, travel times, proposed fares, and intermodal connections. For each proposed station, the area that a station would be likely to serve was defined, and transit access connections for feeder bus routes were entered into the model.

Using the updated transportation network and other future year model inputs (such as population, employment, and other socio-economic data), the model was run for each LRT and BRT build alternative. The model provides both the average linked and unlinked daily transit trips for the proposed transit service. A linked passenger trip includes segments of travel from point-of-origin to point-of-final-destination as a single trip, regardless of transfers or intermediate stops. An unlinked transit trip, on the other hand, is the same as a passenger boarding. An unlinked trip is counted each time a passenger boards a transit vehicle, regardless of bus transfers, transfers from a personal automobile, or whether he or she walked to a transit station. Counting unlinked trips gives a discrete accounting of the actual potential usage of the build alternatives. It is important to note that an individual will likely have more than one transit trip per day—at least one on the way to work and one on the way home. Each trip is counted separately in this analysis. Throughout this section, the terms boardings, riders, and trips all refer to unlinked passenger trips.

The model output also includes detailed information about the daily boardings and alightings at each proposed station, further separated by trip purpose (home, work, or other) and mode of access (Park & Ride, walking to station, or transferring from buses). Other important demand statistics such as vehicle miles and hours travelled by all modes of transportation, the number of linked transit trips in the system, and boardings by each form of transit can also be extracted from the model output.

The results are used to summarize the projected number of forecast annual daily boardings on the proposed transit system and parking demand at each station location.

### 3.2.3 Existing Conditions

Within the VBTES Corridor, Hampton Roads Transit operates fixed local bus routes; a regional express bus service; passenger ferry service between downtown Portsmouth and downtown Norfolk; paratransit service; and The Tide light rail. These services are described below.

- ~ **Fixed Route local bus service:** HRT currently operates over seventy fixed local bus routes that operate at headways between 15 and 70 minutes. In addition, the VB Wave is a seasonal service with three routes serving the Virginia Beach Oceanfront Resort Area.
- ~ **MAX Express Bus service:** MAX offers limited stop express service on seven routes between major destinations in Hampton Roads. The routes operate using over-the-road coach-style buses.
- ~ **Paratransit:** Through a contracted service provider, HRT provides paratransit services, including lift equipped van service, to fulfill ADA requirements. This demand-response service is provided during the same hours of operation as the regularly scheduled HRT buses. The service is available within 3/4 of a mile of regularly scheduled bus routes and is available to certified passengers.
- ~ **Ferry Service:** Through a contracted service provider, HRT provides ferry service on the Elizabeth River between downtown Norfolk and Olde Towne and downtown Portsmouth. The ferry begins at Waterside in Norfolk, with two stops in Portsmouth at High Street and North Landing. Special event service is provided between North Landing and Harbor Park during Norfolk Tides minor league baseball games.
- ~ **The Tide:** HRT operates The Tide, a 7.4 mile light rail transit line running from the Fort Norfolk/EVMC station, through downtown Norfolk, east to the Norfolk/Virginia Beach border at Newtown Road.

Within the VBTES Corridor, HRT operates the following fixed route bus services as of August, 2014. **Table 3.2-1** shows the average monthly ridership for 2013. A map of these routes is shown in **Figure 3.2-1**.

- ~ **Route 1 - Downtown Norfolk/Pembroke East:** This route runs from the Downtown Norfolk Transit Center (DNTC) north on Granby Street, through the Ocean View section of Norfolk, then into Virginia Beach south on Independence Boulevard to the Town Center of Virginia Beach area. This route operates with 15 minute headways during peak periods and 30 minutes in the off peak, seven days a week.

- ~ **Route 20 - Downtown Norfolk/Virginia Beach Oceanfront:** This route runs from the DNTC to the Virginia Beach Oceanfront Resort Area primarily along Virginia Beach Boulevard and Laskin Road. The Newtown Road Station of The Tide is currently served by this route. Service frequencies are 15 minutes in peak hours and 30 minutes during non-peak hours, seven days a week.
- ~ **Route 22 – Newtown Road Station/Joint Expeditionary Base Little Creek:** From The Tide's Newtown Road Station, this route serves Newtown Road, Wesleyan Drive, Haygood Road, Independence Boulevard, and Shore Drive to reach the Joint Expeditionary Base Little Creek. This route operates with 60 minute service frequencies from approximately 6:00 a.m. to 7:00 p.m., Monday through Saturday.
- ~ **Route 25 – Military Circle/Princess Anne:** This route begins at the Military Circle Transfer Center in Norfolk, has a stop at the Newtown Road Station of The Tide, and then continues along Princess Anne Road in Virginia Beach to serve the Tidewater Community College (TCC) campus in Virginia Beach and the Virginia Beach Municipal Center. This route operates with 60 minute service frequencies from approximately 6:00 a.m. to 1:00 a.m., Monday through Saturday.
- ~ **Route 26 – Lynnhaven Mall/TCC Virginia Beach:** This route connects Lynnhaven Mall with TCC in Virginia Beach via Lynnhaven Parkway, with alternating runs serving Holland Road and Rosemont Road. This route has 30 minute service frequencies and operates approximately between 6:30 a.m. and 7:00 p.m., Monday through Saturday.
- ~ **Route 27 – Pleasure House Road/Newtown Road:** This route begins at the Pleasure House Transfer Center near the corner of Pleasure House Road and Shore Drive, continues to Northampton Boulevard, then serves Wesleyan Drive, Baker Road, and Newtown Road until reaching The Tide's Newtown Road Station. This route has 30 minute frequencies approximately between 6:00 a.m. and 1:00 a.m., Monday through Saturday.

Figure 3.2-1 | Existing Transit Network in the VBTES Corridor

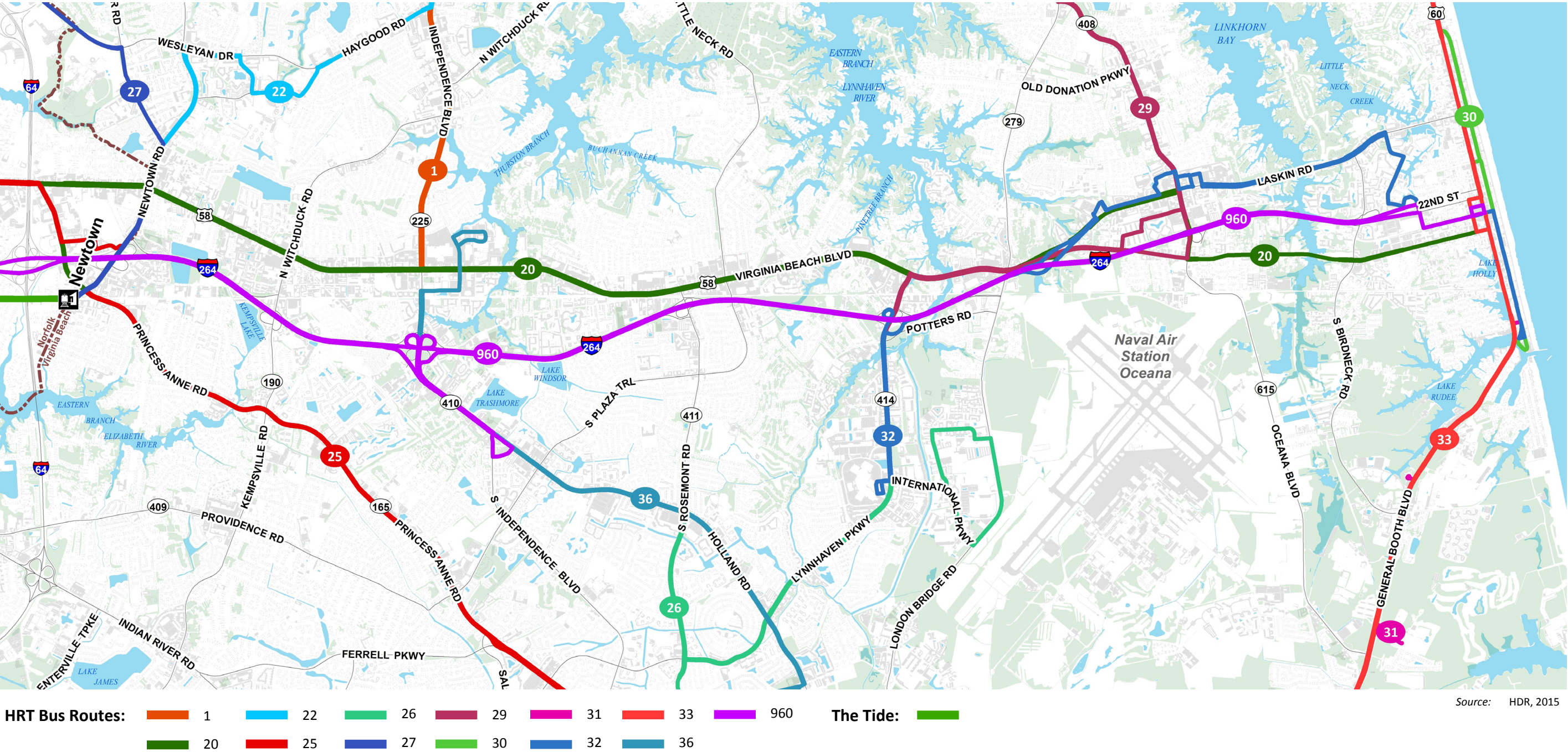


Table 3.2-1 | Monthly Ridership for Bus Service in the VBTES Corridor (2013)

Route	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1	80,476	82,552	77,687	83,017	85,959	73,375	77,215	80,494	82,350	82,539	97,384	80,290
20	118,197	110,505	117,437	120,828	124,064	114,951	119,840	122,005	117,856	117,296	100,535	101,507
22	5,520	5,617	5,892	6,350	6,510	6,206	7,169	7,644	7,440	7,670	7,008	7,056
25	12,626	12,492	12,673	13,625	12,235	11,710	12,071	12,752	14,071	14,234	11,708	11,100
26	5,580	5,435	5,959	5,940	5,690	5,362	6,086	6,377	6,605	6,959	6,102	5,445
27	9,620	9,128	9,515	10,634	10,837	9,655	9,871	10,257	10,109	10,763	8,632	9,282
28	3,661	3,511	3,513	3,921	3,866	3,557	4,950	5,340	4,642	5,074	3,766	3,985
29	7,946	7,927	8,366	8,676	8,911	7,734	8,247	8,806	9,148	9,446	7,528	7,567
30 <sup>1</sup>	N/A	N/A	N/A	N/A	22,401	62,083	95,200	82,292	27,996	326	N/A	N/A
31 <sup>1</sup>	N/A	N/A	N/A	N/A	3,771	13,011	28,017	19,798	1,467	212	222	N/A
32 <sup>1</sup>	N/A	N/A	N/A	N/A	1,864	8,248	10,623	10,867	797	N/A	N/A	N/A
33	10,838	10,376	11,248	12,660	11,791	10,577	11,256	11,241	11,034	12,374	9,202	8,939
36	21,210	20,759	21,280	21,492	19,595	18,606	18,072	19,544	19,140	20,580	16,046	15,768
960	6,422	5,800	6,969	7,975	8,914	9,634	8,832	9,198	8,251	6,571	4,640	4,538

Source: Hampton Roads Transit, 2014 <sup>1</sup> VB Wave service operates on a seasonal basis.

~ **Route 29 – Pleasure House Road/Lynnhaven Parkway:** Starting at the transfer center at the intersection of Pleasure House Road and Shore Drive, this route travels along Shore Drive, Great Neck Road, First Colonial Road, Virginia Beach Boulevard, and Lynnhaven Parkway to Lynnhaven Mall. This route has 60 minute service frequencies between 7:00 a.m. and 7:00 p.m., Monday through Saturday.

~ **Routes 30, 31, 32 – VB Wave:** These three routes operate seasonally in the Oceanfront Resort Area, seven days a week from May to September. Route 30 is a circulator route that runs primarily along Atlantic Avenue approximately every 10 minutes. Route 31 connects the Rudee Loop area south to destinations including campgrounds and the Virginia Aquarium and Marine Science Center. Route 32 connects the

Oceanfront Resort Area to shopping destinations at Hilltop and Lynnhaven Mall as well as other destinations such as the Virginia Museum of Contemporary Art.

~ **Route 33 – North Seashore/Municipal Center/TCC:** From its northern end point at Atlantic Avenue and 68th Street, this route travels along Atlantic Avenue, Pacific Avenue, General Booth Boulevard, and Princess Anne Road to reach the TCC Virginia Beach campus. This route serves the Oceanfront Resort Area, the commercial area at Red Mill, and the Virginia Beach Municipal Center. This route operates with 60 minute headways from 7:00 a.m. to 7:00 p.m., seven days a week.

~ **Route 36 – Pembroke East/TCC Virginia Beach:** This route begins at the Pembroke East Transfer Center near the Town Center of Virginia Beach and continues along Independence Boulevard and Holland Road to reach the

TCC Virginia Beach campus. It has 30 minute frequencies during peak periods and 60 minute frequencies in the off peak, from 6:00 a.m. to 11:00 p.m. on Mondays through Saturdays.

~ **MAX Route 960 – Virginia Beach/Norfolk:** This route connects downtown Norfolk to the Oceanfront Resort Area with limited stops at the Silverleaf Park & Ride and Pacific Avenue and 19<sup>th</sup> Street. Buses run every hour between 6:00 a.m. and 9:00 p.m., seven days a week.

3.2.4 Environmental Impacts

Each of the build alternatives would include an extension of high capacity, fixed guideway transit service from The Tide’s Newtown Road Station east into Virginia Beach. There would be new transit stations, and the existing fixed route bus system would expand service to create a feeder network for the LRT or BRT system.

No Build Alternative

Under the No Build alternative, the fixed guideway extension would not be undertaken. Local bus routes would not be modified to match the build alternatives span of service, and no new local bus routes would be established to complement the build alternatives. Transit service in the VBTES Corridor would continue to be adjusted based on the service needs of the City including regular review, update, and implementation of HRT’s *Transit Development Plan*.

Build Alternatives

For ease of comparison between the build alternatives and to avoid duplication, the LRT and BRT alternatives are described together in the following sections.

Local Bus Modifications

This existing local bus routes in Virginia Beach would be modified as part of all of the build alternatives. These routes would become a feeder system for the proposed LRT or BRT stations. The modifications would include increases in bus frequencies and extended hours of operation. In some cases, there would be changes to existing bus route alignments, and several new routes would be created. The purpose of these changes is to coordinate with the new fixed guideway service, enhance local connectivity throughout the City, and reduce duplication of services. A summary of all proposed modifications can be found in Chapter 2, **Table 2.1-2**. The following describes the proposed new or revised routes:

- ~ **Route 10:** This route would replace the northern portion of Route 33, from a transfer area near the Oceanfront Station to the Fort Story portion of Joint Expeditionary Base Little Creek-Fort Story.
- ~ **Route 28:** This route would provide limited stop service on a segment shared with Route 20 primarily along Virginia Beach Boulevard and Laskin Road to connect the Town Center Station with the Oceanfront Resort Area.
- ~ **Route 35:** This feeder bus route would be implemented as part of Alternatives 2 or 3. It would provide service between NAS Oceana and Sentara Virginia Beach General Hospital via Oceana Boulevard, First Colonial Road, Potters Road, London Bridge Road, North Great Neck Road, and Old Donation Parkway.
- ~ **Route 38:** This feeder bus route would connect the Greenbrier Mall Transfer Center to the Witchduck Station via Volvo Parkway, Kempsville Road, and Witchduck Road.
- ~ **Route 39:** This route would incorporate the southern portion of Route 29 (which would be modified to end in the Hilltop Area) as well as the VB Wave Route 32. In addition, the route would serve Sentara Princess Anne Hospital.

Ridership Demand

**Table 3.2-2** presents a summary of the 2034 projected passenger boardings for each of the build alternatives. It includes boardings at proposed stations in Virginia Beach as

well as total boardings for the entire HRT light rail system from the EVMC/Fort Norfolk Station in Norfolk to the east end of the alignment in Virginia Beach. The LRT build alternatives would be an extension of The Tide and therefore provide a one-seat ride to all proposed stations in Virginia Beach. The BRT alternatives are a different vehicle technology and would require a transfer at the Newtown Road Station. While the BRT stations would be at the same locations as the LRT stations and BRT travel speeds would be approximately the same as LRT, the ridership model treats the BRT alternatives as a bus mode. Therefore, some model parameters that treat the LRT as a more attractive or “premium” mode of transportation were not applied to the BRT mode. Note that because the tables report unlinked passenger trips as noted above, LRT and BRT riders transferring at Newtown Road are counted twice—once when they board initially and a second time when they transfer.

As shown in **Table 3.2-2**, Alternative 1A for LRT and BRT is projected to carry the least number of riders of the alternatives under consideration, as would be expected because of its shorter length. Alternative 1B would have 10,550 boardings for the LRT mode and 8,420 for the BRT. The LRT version of Alternative 2 would carry approximately 12,830 riders a day in 2034. The BRT version of Alternative 2 would have 10,820 boardings combined between the BRT in Virginia Beach and The Tide LRT in Norfolk. Of all the

alternatives modeled, the LRT version of Alternative 3 is projected to carry the most riders, about 16,665 per day in 2034. This is primarily due to the fact that this alternative serves the Hilltop Area of Virginia Beach, which has more intensive land uses compared to the area surrounding the former NSRR ROW east of London Bridge Creek on Alternative 2. The BRT version of Alternative 3 is projected to have 13,385 combined boardings, which is also the highest among the BRT alternatives under consideration. In general, the LRT build alternatives are projected to carry approximately 20 percent more riders than the BRT alternatives.

**Table 3.2-3** shows the year 2034 boardings at each station for the LRT and BRT alternatives, including existing stations of The Tide in Norfolk. In general, the proposed stations with the largest ridership are Witchduck, Town Center, and Rosemont. For each alternative, the LRT ridership is greater than the corresponding BRT ridership, except at Newtown Road due to transfers between The Tide and the BRT system.

Patrons would arrive at the LRT or BRT stations via various modes of transportation, such as driving to a Park & Ride, walking, or transferring from a feeder bus. The ridership forecast model estimates the proportion of boardings that access the station by each mode. At this phase of project development, no constraints were placed on the number of parking spaces available at most stations. The model does

not restrict the number of people who are on an LRT or BRT vehicle at any given time, even if it would result in a transit vehicle being over capacity.

The modes of access for each station in the VBTES Corridor project alternatives are shown in **Table 3.2-4** for all four LRT build alternatives. The BRT alternatives would have approximately the same shares as the LRT. The highest share of boardings accessed by walking would most likely occur at the Birdneck Station under Alternative 3. The Lynnhaven Station in Alternative 3 is projected to have the highest proportion of Park & Ride use. The North Oceana Station would have a significant share of boardings that are transfers from feeder buses.

Ridership from Special Events

The travel demand model is developed to project transit ridership for the most common categories of trips that occur: home-based work trips (trips from home to work and work to home), home-based other trips (trips from home to other places such as shopping and entertainment), and non home-based trips (trips that do not originate or end at home such as trips from the mall to the beach). The model does not account for other types of trips that may occur, such as to or from special events or those taken by tourists. Selected special event activities that take place in Virginia Beach and Norfolk are listed in **Table 3.2-5**.

A Cross-Visitation survey conducted in 2011-2012 by Continental Research Foundation for the City of Virginia Beach showed that there are approximately 6.8 million day visitors and 5.9 million overnight guests who visit destinations within the VBTES Corridor each year. It is expected that a portion of these visitors would use transit to travel between destinations along the VBTES Corridor. The number of additional boardings for tourist trips is calculated using a separate procedure outside of the standard travel demand model. This procedure assumed that 2% of visitors arriving by air and 1% of visitors arriving by automobile would use the fixed guideway transit, and each visitor would generate two trips (an initial trip and a return trip). Based on this method, an estimated 221,000 annual trips would be added in the summer and late summer months and 119,000 annual trips would be added during the non-summer months. These calculations are summarized in **Table 3.2-6**.

Table 3.2-2 | 2034 Projected Daily Boardings for the LRT and BRT Alternatives

	LRT ALTERNATIVES					BRT ALTERNATIVES			
	1A	1B	2	3		1A	1B	2	3
Virginia Beach LRT Stations	2,250	3,370	5,295	8,845	Virginia Beach BRT Stations	1,440	1,980	3,365	5,690
					Norfolk BRT Station	900	980	1,030	1,040
<b>Total System</b> (Virginia Beach and Norfolk)	<b>9,300</b>	<b>10,550</b>	<b>12,830</b>	<b>16,665</b>		<b>7,770</b>	<b>8,420</b>	<b>10,820</b>	<b>13,385</b>

Note: The terms boardings, trips, and riders all refer to unlinked passenger trips.

Source: HDR, 2014

Table 3.2-3 | Projected Year 2034 Average Weekday LRT and BRT Boardings by Station

	LRT ALTERNATIVES				BRT ALTERNATIVES			
	1A	1B	2	3	1A	1B	2	3
NORFOLK STATIONS (THE TIDE)								
EVMC/Fort Norfolk	850	850	885	910	700	690	730	730
York Street/Freemason	350	350	355	360	300	290	300	290
Monticello	600	620	635	650	500	500	520	520
MacArthur Square	800	810	845	885	640	650	690	700
Civic Plaza	600	610	665	705	490	500	545	565
Harbor Park	450	440	440	450	350	350	360	360
NSU	500	530	560	590	450	430	460	470
Ballentine/Broad Creek	500	510	525	530	410	420	420	420
Ingleside Road	200	225	240	245	190	180	200	200
Military Highway	1,000	1,025	1,125	1,175	830	830	900	950
Newtown Road (LRT)	1,200	1,210	1,260	1,320	570	620	1,300	1,450
Newtown Road (BRT)	N/A	N/A	N/A	N/A	900	980	1,030	1,040
VIRGINIA BEACH STATIONS								
Witchduck	900	830	895	950	540	490	575	615
Town Center	1,350	1,550	1,725	1,890	900	910	1,100	1,220
Rosemont	N/A	990	940	1,050	N/A	580	600	680
Lynnhaven	N/A	N/A	570	360	N/A	N/A	365	230
North Oceana	N/A	N/A	200	N/A	N/A	N/A	120	N/A
Great Neck	N/A	N/A	N/A	895	N/A	N/A	N/A	575
Hilltop West	N/A	N/A	N/A	1,075	N/A	N/A	N/A	700
Hilltop East	N/A	N/A	N/A	450	N/A	N/A	N/A	300
Birdneck	N/A	N/A	N/A	920	N/A	N/A	N/A	600
Convention Center	N/A	N/A	210	225	N/A	N/A	130	120
Oceanfront	N/A	N/A	755	1,030	N/A	N/A	475	650
Total LRT Boardings	9,300	10,550	12,830	16,665	5,430	5,460	6,425	6,655
Total BRT Boardings	0	0	0	0	2,340	2,960	4,395	6,730
Total System Boardings	9,300	10,550	12,830	16,665	7,770	8,420	10,820	13,385

Note: The terms boardings, trips, and riders all refer to unlinked passenger trips.

Source: HDR, 2013

Table 3.2-4 | Mode of Access for Virginia Beach Stations

Stations	Alternative 1A			Alternative 1B			Alternative 2			Alternative 3		
	Walk	P&R	Transfer	Walk	P&R	Transfer	Walk	P&R	Transfer	Walk	P&R	Transfer
Witchduck	52%	27%	21%	53%	15%	32%	53%	14%	32%	53%	14%	33%
Town Center	62%	21%	17%	61%	11%	28%	61%	10%	29%	61%	9%	30%
Rosemont				68%	32%	0%	79%	21%	0%	82%	18%	0%
Lynnhaven							40%	32%	28%	55%	45%	0%
North Oceana							0%	26%	74%			
Great Neck										44%	7%	49%
Hilltop West										67%	7%	27%
Hilltop East										88%	11%	2%
Birdneck										90%	10%	0%
Convention Center							34%	66%	0%	62%	38%	0%
Oceanfront							53%	1%	47%	54%	0%	46%

Note: The mode of access at the Town Center Station applies to all station options.

Source: HDR, 2014

Table 3.2-5 | Selected Annual Special Events and 2014 Estimated Attendance

Special Events in Virginia Beach—All events take place in the Oceanfront Resort Area		Attendance
~ Neptune Festival (Last weekend in September)		450,000
~ East Coast Surfing Championships (August)		235,000
~ Boardwalk Art Show (June)		150,000
~ Independence Day Fireworks (July)		100,000
~ North American Sand Soccer Championships (February-May)		90,000
~ American Music Festival (Labor Day Weekend)		85,000
~ Patriotic Festival (May/June)		55,000
~ Rock & Roll Half Marathon (Labor Day weekend)		35,000 runners and spectators
~ Shamrock Sportsfest Weekend (March)		28,000
~ Monsters at the Beach—Monster truck competition on the sand (May)		17,000
**Convention Center – approximately 175 annual events at the Convention Center		
Special Events in Norfolk—All events take place in Downtown Norfolk		Attendance
~ Harborfest (June)		250,000
~ Grand Illumination Parade (November)		80,000
~ Town Point Virginia Wine Festival (May and October)		25,000
~ Bayou Boogaloo & Cajun Food Festival (June)		20,000
~ Virginia Children’s Festival (October)		15,000
~ Independence Day Fireworks (July)		12,000

Source: City of Virginia Beach SGA Resort Management Office and Norfolk Festevents , 2013

Table 3.2-6 | Special Event and Tourist Trips

Arrivals by Air	Total Annual Number of Visitors	% Visitors by Air	Visitors by Air	Generated Trips	Transit Share	Transit Trips
Day visitors	6,800,000	0.34	2,312,000	4,624,000	0.02	92,480
Overnight visitors	5,900,000	0.34	2,006,000	4,012,000	0.02	80,240
Arrivals by Auto	Total Annual Number of Visitors	% Visitors by Auto	Visitors by Auto	Generated Trips	Transit Share	Transit Trips
Day visitors	6,800,000	0.66	4,488,000	8,976,000	0.01	89,760
Overnight visitors	5,900,000	0.66	3,894,000	7,788,000	0.01	77,880
Total annual transit trips						340,360
Summer and late summer transit trips (65%)						221,000
Non-summer transit trips (35%)						119,000

Source: HDR, 2014

Table 3.2-7 | Summary of Daily and Annual Ridership for LRT and BRT Alternatives

	LRT ALTERNATIVES			
	1A	1B	2	3
Weekday	9,300	10,550	12,830	16,665
Annual weekdays	2,418,000	2,743,000	3,335,800	4,332,900
Weekend day	3,999	4,537	5,517	7,166
Annual weekend days	419,895	476,333	579,275	752,425
Total annual (weekday and weekend)	2,837,895	3,219,333	3,915,075	5,085,325
Annual Special events/tourist trips	102,000	102,000	340,000	340,000

Total (Rounded) 2,939,900 3,321,000 4,255,000 5,425,000

	BRT ALTERNATIVES			
	1A	1B	2	3
Weekday	7,770	8,420	10,820	13,385
Annual weekdays	2,020,200	2,189,200	2,813,200	3,480,100
Weekend day	3,341	3,621	4,653	5,756
Annual weekend days	350,816	380,163	488,523	604,333
Total annual (weekday and weekend)	2,371,016	2,569,363	3,301,723	4,084,433
Annual Special events/tourist trips	102,000	102,000	340,000	340,000

Total (Rounded) 2,473,000 2,671,350 3,641,700 4,424,450

Note: The terms boardings, trips, and riders all refer to unlinked passenger trips.  
Source: HDR, 2014

Table 3.2-7 shows a summary of daily and annual ridership for all the LRT and BRT alternatives. It shows that more than 90% of the annual ridership consists of the weekday and weekend ridership forecasted by the travel demand model. Special event and tourist trips are projected to range from 3% to 9%, depending on the alternative. In general, the LRT alternatives are likely to generate from 16% to 24% higher ridership than the corresponding BRT alternatives.

3.2.5 Construction Impacts

Construction of the LRT and BRT build alternatives would result in temporary effects to existing transit services. Installation of at-grade crossings and grade separation structures over roads would result in temporary road closures that may require adjustments to bus routes and changes to bus stops. Bus stops in construction areas could be closed or relocated temporarily due to safety concerns and limited pedestrian access to reach the stops could occur.

For LRT alternatives, construction of tracks and crossovers near the Newtown Road Station would require temporary shutdowns of the existing tracks of The Tide. These shutdowns would be limited to the time needed to complete the work. During the shutdown periods, bus service would be provided between the Newtown Road Station and other stations on The Tide, such as the Military Highway Station. A temporary light rail operations plan would be developed prior to construction.

Modifications at the Newtown Road Station bus loading area to accommodate a BRT platform would affect the fixed route buses that currently serve the station. During construction, bus stops and shelters would need to be relocated away from the work zone, and bus routes may be adjusted if construction activities require the bus loop to be closed.

The maintenance of traffic plans that are developed during final design will address bus routes as well as pedestrian access throughout construction zones, including access to bus stops and the area around the Newtown Road Station. Changes to bus routes and bus stops would be limited in duration to the periods when construction poses a safety hazard or prevents access. Hampton Roads Transit would notify the public in advance of any work that would require adjustments to light rail or bus services.

3.2.6 Indirect Effects

Improvements to transit service in the VBTES Corridor would have additional effects beyond the movement of people. Transit services may have an effect on the total number of vehicle miles traveled (VMT) in the VBTES Corridor by partially offsetting expected increases in VMT that would occur due to forecasted growth. When trips are taken using transit instead of automobiles, there are beneficial effects by reducing gasoline consumption and air pollution from individual vehicles.

The build alternatives would also have a qualitative regional net benefit by coordinating the span of transit services in Norfolk and Virginia Beach. As part of the build alternatives, the hours of operation for the feeder bus network in Virginia Beach would be extended to roughly match those in the City of Norfolk. This would take a step toward an integrated transit network that would benefit the region by improving mobility between the two cities.

Fixed guideway transit may influence development patterns near stations that encourage more trips by walking or biking instead of using cars. There may be disruptions to existing land use patterns in those areas, but new development would be consistent with the City’s Strategic Growth Area plans and enhance the long-term economic viability of the area.

3.2.7 Avoidance, Minimization, and Mitigation

Because the proposed build alternatives improve public transportation service throughout the VBTES study area, there are no permanent adverse effects on public transportation created by any of the build alternatives. Therefore, no mitigation measures are required.

3.3 Parking Facilities

This section describes existing and new parking facilities proposed under the build alternatives. Potential impacts to parking facilities are discussed in this section, including at proposed Park & Ride sites and other locations that would be affected because of construction of the LRT or BRT alternatives.

3.3.1 Legal and Regulatory Context

The City of Virginia Beach regulates the provision of off-street parking through the Zoning Ordinance in Appendix A of the City Code. On-street parking is also enforced by the City. The City of Virginia Beach Department of Public Works has authority under the City Code to identify areas where on-street parking is prohibited or limited.

3.3.2 Methodology

On-street and off-street parking locations were determined by using aerial photography and conducting field observations. The City of Virginia Beach 2011 Resort Management Annual Report was used to assess the parking inventory owned by the City in the Oceanfront Resort Area and at the Town Center of Virginia Beach.

The number of parking spaces required for each station was estimated using the mode of access from the ridership forecast model for the year 2034. Although many passengers would likely drive alone to the transit station, some may share rides with others. To account for this, the estimated number of passengers who drive to each station was divided by a vehicle occupancy factor of 1.12 passengers per vehicle to estimate the parking demand.

Conceptual site plans for each proposed Park & Ride location were developed to maximize the number of parking spaces on the site, while taking into account required site elements such as stormwater management basins, landscaping buffers, pedestrian walkways, and access driveways. The actual number of parking spaces required and provided at each Park & Ride lot will be determined during final design.

3.3.3 Existing Conditions

Vehicle parking in the VBTES Corridor is provided by both public and private facilities. Private facilities such as surface parking lots, driveways, and garages are found throughout the VBTES Corridor. Public parking facilities include surface lots, garages, on-street parking in designated areas at the Town Center of Virginia Beach and the Oceanfront Resort Area, and on-street parking in other areas.

Private parking in the VBTES Corridor is generally related to a specific land use or development. Outside of the Town

Center of Virginia Beach and the Oceanfront Resort Area, individual shopping centers, businesses, and residential complexes provide sufficient parking for their use in accordance with the City’s zoning requirements. Field observations found no areas in the VBTES Corridor, except the Oceanfront Resort Area, where parking demand exceeds supply on a sustained basis during the summer season and for special events.

Town Center Public Parking Summary

The Town Center of Virginia Beach is served by approximately 4,550 public parking spaces. There are approximately 4,280 spaces in four parking garages, 321 spaces in two surface lots, and 86 two-hour on-street spaces. ADA accessible parking spaces are found in the parking structures and surface lots. Public parking at Town Center is currently free, but the City charges a fee for a limited number of reserved spaces in the parking garages.

Table 3.3-1 summarizes the City-owned parking facilities within a one-half mile walking distance of the proposed Town Center Station, Figure 3.3-1 shows new development at Town Center, and Figure 3.3-2 shows the location of the parking facilities (the table and figure apply to all four location options under consideration).

Table 3.3-1 | City-Owned Parking within One-Half Mile of Proposed Town Center Station

Facility	Spaces
On-street parking	86
Block 2 Surface Lot	186
Armada Hoffer Tower Garage	1,284
Westin Hotel Garage	723
Cosmopolitan Garage	851
Market Street Garage	574
4525 Main Street Garage	934
Block 9 Surface Lot	135

Source: 2011 Resort Management Annual Report, City of Virginia Beach

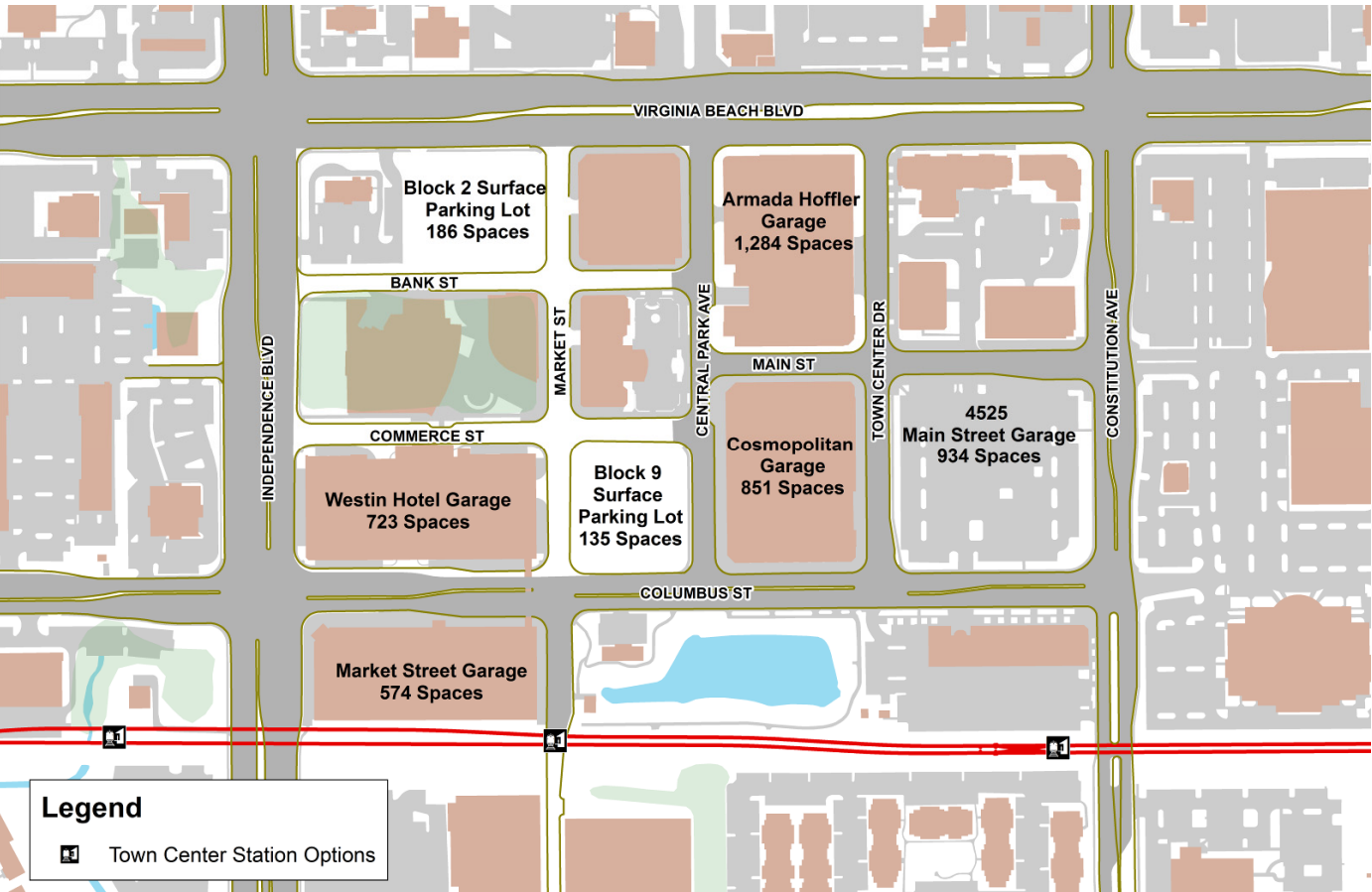
Figure 3.3 -1 Town Center of Virginia Beach



Source: www.towncenterofvirginiabeach.com, 2014



Figure 3.3-2 | Locations of City-Owned Parking within ½ mile of Proposed Town Center Station



Source: www.vbgov.com, City of Virginia Beach, 2014

Oceanfront Public Parking Summary

The City of Virginia Beach operates two parking garages, nine surface parking lots, a residential parking permit program, and metered parking spaces in the Oceanfront Resort Area, totaling approximately 2,900 off-street parking spaces and 4,700 on-street parking spaces (647 spaces are metered). A new parking garage is under construction to replace the surface lot at 25<sup>th</sup> Street, which will support adjacent development as well as provide public parking for the area. High seasonal turnover rates are associated with most of the Oceanfront Resort Area parking as a result of increased tourism activity, particularly during the summer months. Metered parking promotes higher turnover over shorter periods of time, and it is enforced seven days a week, 24 hours a day, from April 1 through October 31. Unmetered parking in the Oceanfront Resort Area is

managed by the Residential Permit Parking Program. Parking lots and garages owned by the City charge daily or hourly fees, depending on location.

**Table 3.3-2** summarizes the existing off-street parking facilities owned by the City within a one-half mile walking distance of the proposed Oceanfront Station, which is located at 19<sup>th</sup> Street and Arctic Avenue. **Figure 3.3-3** shows activity in the Oceanfront Resort Area, and **Figure 3.3-4** shows the location of these parking facilities. The two lots located on 19<sup>th</sup> Street contain 538 parking spaces. An additional 377 spaces will become available in the new City-owned garage at 25<sup>th</sup> Street that is scheduled to open in 2015.

Figure 3.3-3 Virginia Beach Oceanfront Resort Area



Source: City of Virginia Beach Convention and Visitor's Bureau, 2014

Table 3.3-2 | City-Owned Off-Street Parking within One-Half Mile of Proposed Oceanfront Station

Facility	Spaces
19 <sup>th</sup> Street North Lot	334
19 <sup>th</sup> Street South Lot	204

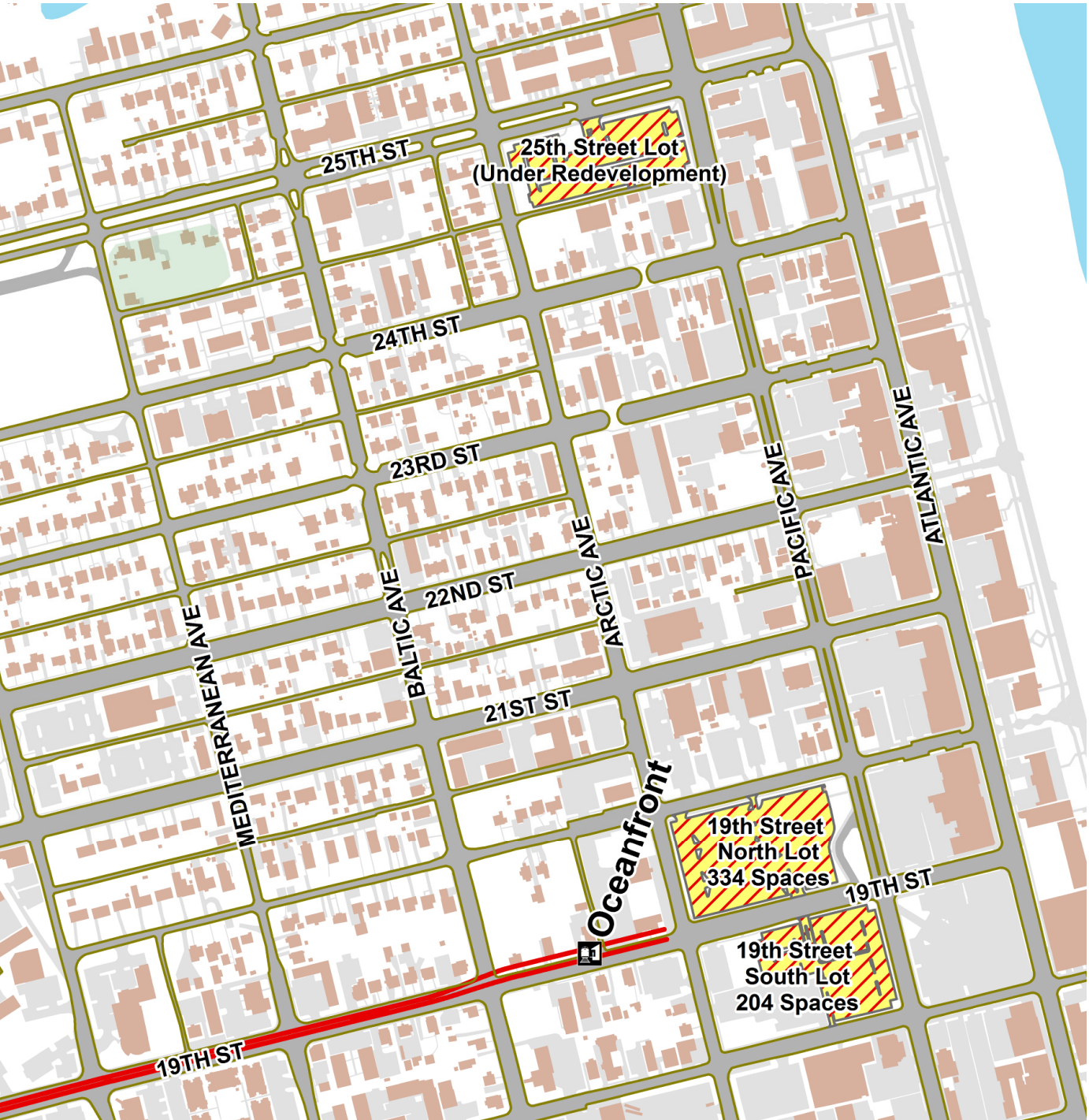
Source: www.vbgov.com, City of Virginia Beach, 2014

*Note: The two 19<sup>th</sup> Street Lots are currently being considered for redevelopment, although no plans have been finalized*

*The 25th Street Lot is currently being redeveloped. The site plan calls for 377 public parking spaces in a new structure that the City will own and operate, in addition to 221 spaces that will be leased by the developer for use by residents of an adjacent apartment building.*



Figure 3.3-4 | Locations of City-Owned Parking within ½ mile of Proposed Oceanfront Station



Source: www.vbgov.com, City of Virginia Beach, 2014

3.3.4 Environmental Impacts

No Build Alternative

Under the No Build alternative, none of the build alternatives would be constructed; thus, there would be no project-related impacts to parking in the VBTES Corridor. Future changes in land use and site development not related to the proposed project would still occur with resulting changes to available public and private parking. Projects planned by the City of Virginia Beach would also occur, such as improvements to 19<sup>th</sup> Street and construction of new parking facilities in the Oceanfront Resort Area. Any such future changes to land use and/or site development would be in accordance with the City of Virginia Beach’s zoning and building codes, which include requirements for adequate parking.

LRT Build Alternatives

The build alternatives have the potential to both increase and decrease the parking supply in the VBTES Corridor. Parking supply losses could occur through the conversion of private parking areas to station sites and other transportation uses, and parking supply increases could occur at new Park & Ride lots.

The following sections summarize the various physical parking characteristics associated with each alternative.

ALTERNATIVE 1A: Town Center Alternative

Under Alternative 1A, a Park & Ride lot would be provided for each of the proposed stations (Witchduck and Town Center). Site layouts and descriptions for each proposed station can be found in **Section 2.1.2**. Conceptual plans show that approximately 480 parking spaces would be provided, as shown in **Table 3.3-3**.

Parking for the proposed Witchduck Station would be developed in coordination with the City’s planned Housing Resource Center at the intersection of Southern Boulevard and Jersey Avenue. Access to the proposed lot would be provided off Southern Boulevard and Jersey Avenue. The proposed Park & Ride site is a vacant former commercial building and warehouse that is currently owned by the City of Virginia Beach. There are approximately 40 parking spaces on the site adjacent to the now-vacant commercial building and a large paved area surrounding the warehouse that may have also been used for parking. To accommodate the Park & Ride lot, this area would be reconstructed and the existing buildings removed. The proposed Park & Ride lot could provide as many as 250 spaces. The projected parking demand for transit use under Alternative 1A is 217 spaces. There may be opportunities to have a joint-use parking facility with the planned Virginia Beach Housing Resource Center, but parking requirements for that development have not been identified at this time.

Table 3.3-3 | LRT Alternative 1A Parking Summary

Station	Existing (Current) Parking Spaces on Site <sup>1</sup>	Projected Station Parking Demand in 2034 <sup>2</sup>	New Station Parking Proposed <sup>3</sup>	Proposed Parking Use
Witchduck	40	217	250	Transit only
Town Center (all station options)	209	253	230	Transit only
Alternative 1A Totals	249	470	480	

<sup>1</sup>Approximate spaces based off aerials and field observations.

<sup>2</sup>Required spaces based on 2034 ridership forecast.

<sup>3</sup>Proposed number of spaces is approximate and may change during final design.

Source: Fitzgerald & Halliday, 2014



Although there are four options for the Town Center Station location, all of them would be served by a Park & Ride lot located at the northeast corner of Independence Boulevard and Garrett Drive, south of the former NSRR ROW. Access to the proposed Park & Ride lot would be provided from Garrett Drive. A parking lot that provides approximately 209 spaces and a commercial building owned by the City currently exist on the site. The existing parking area would be reconstructed and the building removed to accommodate the Park & Ride lot. The proposed Park & Ride lot based on the conceptual design could provide as many as 230 spaces, which is approximately 23 fewer spaces than the projected demand. However, the 480 proposed parking spaces within the VBTES Corridor at the Witchduck and Town Center stations combined remains greater than the total projected demand of 470 spaces, as shown in **Table 3.3-3**. Patrons who encounter a full Park & Ride lot at one station could choose to drive to another nearby station that would likely have available parking, or they could use another mode of travel. Additional study

regarding these behaviors and design of Park & Ride facilities to identify the exact number of spaces will take place during later phases of design.

ALTERNATIVE 1B: Rosemont Alternative

Under Alternative 1B, a Park & Ride lot would be provided for each of the three proposed stations (Witchduck, Town Center, and Rosemont). Site layouts and descriptions for each proposed station can be found in **Section 2.1.2**. Conceptual plans show that a total of approximately 655 parking spaces would be provided, as shown in **Table 3.3-4**.

Between The Tide’s Newtown Road Station and the proposed Town Center Station, Alternative 1B would have the same stations and Park & Ride lots as those identified for Alternative 1A. The projected parking demand at the Witchduck and Town Center Park & Ride lots is lower in Alternative 1B due to changes in ridership and the proportion of riders who are forecasted to be driving to those stations compared to Alternative 1A, which ends at Town Center. At the Rosemont Station, parking is proposed

at the southeast corner of Virginia Beach Boulevard and Lynn Shores Drive. Access to the proposed lot would be provided from Bonney Road. The site is undeveloped except for three billboard structures that would be removed. The proposed Park & Ride lot could provide as many as 175 spaces based on the available space on the site. This lot would not accommodate the unconstrained forecasted demand of 285 spaces that is projected for Alternative 1B. Additional study would be required in future stages of project development to determine the effects of spillover parking or changes in ridership patterns because of the lack of adequate parking. As indicated in **Table 3.3-4**, the proposed 655 parking spaces for the three stations in Alternative 1B combined is approximately 100 greater than the projected demand of 553. Potential riders would have the opportunity to use Park & Ride lots at other stations or choose another mode of transportation to reach their destination if their first station choice does not have parking available when they arrive.

ALTERNATIVE 2: NSRR Alternative

Between The Tide’s Newtown Road Station and the proposed Rosemont Station, Alternative 2 would have the same stations and Park & Ride lots as those identified for Alternative 1B. However, because this alternative includes stations and Park & Ride lots east of Rosemont Road, the forecasted parking demand at the Rosemont Station is reduced to 177 spaces, which is approximately the capacity of the lot developed for the conceptual design.

Alternative 2 would provide two additional Park & Ride lots: one at the Lynnhaven Station and the other at the North Oceana Station. Alternative 2 would also make use of existing public parking at the Convention Center and Oceanfront Stations. Site layouts and descriptions for each proposed station can be found in **Section 2.1.2**. Approximately 1,105 new parking spaces could be provided based on conceptual designs to accommodate a demand of 785 spaces, as shown in **Table 3.3-5**.

Table 3.3-4 | LRT Alternative 1B Parking Summary

Station	Existing (Current) Parking Spaces on Site <sup>1</sup>	Projected Station Parking Demand in 2034 <sup>2</sup>	New Station Parking Proposed <sup>3</sup>	Proposed Parking Use
Witchduck	40	113	250	Transit only
Town Center (all station options)	209	155	230	Transit only
Rosemont	0	285	175	Transit only
Alternative 1B Totals	249	553	655	

<sup>1</sup>Approximate spaces based off aerials and field observations.  
<sup>2</sup>Required spaces based on 2034 ridership forecast.  
<sup>3</sup>Proposed number of spaces is approximate and may change during final design.  
Source: Fitzgerald & Halliday, 2014

Table 3.3-5 | LRT Alternative 2 Parking Summary

Station	Existing (Current) Parking Spaces on Site <sup>1</sup>	Projected Station Parking Demand in 2034 <sup>2</sup>	New Station Parking Proposed <sup>3</sup>	Proposed Parking Use
Witchduck	40	112	250	Transit only
Town Center (all station options)	209	155	230	Transit only
Rosemont	0	177	175	Transit only
Lynnhaven	180	163	175	Transit only
North Oceana	0	47	275	Transit only
Convention Center	*	124	0	Transit and Convention Center
Oceanfront <sup>4</sup>	0	7	0	City public facilities
Alternative 2 Totals	429	785	1,105 + shared	

\*The Convention Center currently has approximately 2,209 parking spaces in adjacent lots. The station would share parking with the Convention Center.  
<sup>1</sup>Approximate spaces based off aerials and field observations.  
<sup>2</sup>Required spaces based on 2034 ridership forecast.  
<sup>3</sup>Number of spaces is approximate and may change during final design.  
<sup>4</sup>Walk-up station, no parking provided  
Source: Fitzgerald & Halliday, 2014



The Lynnhaven Station would provide parking at the northeast corner of Lynnhaven Road and Southern Boulevard. This area is currently occupied by a small office building with 35 parking spaces and an adjacent 145 space paved parking lot that is used by a nearby auto dealership for vehicle storage. The combined existing parking total is approximately 180 private spaces. The building and the existing parking lots would be removed to develop the Lynnhaven Station Park & Ride. The proposed lot could provide as many as 175 spaces, with an estimated transit parking demand of 163 spaces. Access to the proposed lot would be provided via driveways off Southern Boulevard.

The North Oceana Station would have parking on a city-owned parcel north of Potters Road that is currently used for construction material disposal and temporary storm debris storage. The Park & Ride lot would have a new access drive constructed from Potters Road with an at-grade crossing of the LRT tracks. The proposed lot could provide as many as 275 new spaces; the projected parking demand is 47 spaces.

The Convention Center Station would not have a new dedicated parking facility. Instead, it is anticipated that existing Convention Center parking lots adjacent to the station would be available for Park & Ride users. The Convention Center parking lots currently include 2,209 surface parking spaces. Based on projected ridership at the Convention Center Station, 124 of these spaces would be required for transit use in the forecast year.

On-street parking is currently allowed on the north side of 19<sup>th</sup> Street between Baltic Avenue and Arctic Avenue. There are four marked on-street spaces on the north side of the street near Arctic Avenue. The westbound right lane of 19<sup>th</sup> Street is available for parking, but it is a travel lane when not used for that purpose. All of the on-street parking on 19<sup>th</sup> Street would be eliminated as part of a City of Virginia Beach plan to make improvements between Parks Avenue and Arctic Avenue. The LRT tracks and Oceanfront Station would be coordinated with the planned improvements.

The Oceanfront Station would be a walk-up station, with no parking specifically designated for transit use. The ridership model shows a projected parking demand of seven spaces. A new City-owned parking garage is planned for the

property immediately north of the proposed station, which will provide approximately 800 spaces. Transit riders who wish to drive to the Oceanfront Station may use public parking in the area, including the new City-owned parking garage, subject to availability and prevailing parking rates.

ALTERNATIVE 3: Hilltop Alternative

Between The Tide’s Newtown Road Station and the proposed Lynnhaven Station, Alternative 3 would have the same stations and Park & Ride lots identified for Alternative 2. The North Oceana Station and associated Park & Ride lot provided under Alternative 2 would not be constructed as part of Alternative 3, but three additional Park & Ride lots would be provided at the Great Neck, Hilltop East, and Birdneck Stations. Alternative 3’s Hilltop West Station would be a walk-up station without public parking. Parking for the Convention Center and Oceanfront stations would be as described for Alternative 2. Site layouts and descriptions for each proposed station can be found in **Section 2.1.2**. The parking demand at each station differs between Alternatives 2 and 3 because of changes in

ridership patterns; **Table 3.3-6** shows the number of proposed spaces at each station and the forecasted demand. For Alternative 3, approximately 1,480 new parking spaces could be provided with a projected parking demand of 914 spaces.

Parking would be provided for the Great Neck Station at the southwest corner of Virginia Beach Boulevard and Great Neck Road. The proposed site currently consists of commercial buildings and paved areas for parking and storage, and it includes approximately 420 existing private spaces. The existing paved areas would be reconstructed and buildings removed to accommodate the station design. Approximately 250 spaces could be provided for a projected parking demand of 56 spaces. Vehicular access would be provided to the station via Virginia Beach Boulevard and Byrd Lane.

The Hilltop West Station would be a walk-up station, with no designated parking available for use by transit patrons. However, the ridership model predicts a parking demand of 68 spaces for this station.

Table 3.3-6 | LRT Alternative 3 Parking Summary

Station	Existing (Current) Parking Spaces on Site <sup>1</sup>	Projected Station Parking Demand in 2034 <sup>2</sup>	New Station Parking Proposed <sup>3</sup>	Proposed Parking Use
Witchduck	40	119	250	Transit only
Town Center (all station options)	209	152	230	Transit only
Rosemont	0	169	175	Transit only
Lynnhaven	180	145	175	Transit only
Great Neck	420	56	250	Transit only
Hilltop West <sup>4</sup>	0	68	0	Shopping centers / businesses
Hilltop East	0	45	250	Transit only
Birdneck	130	83	150	Transit only
Convention Center	*	77	0	Transit and Convention Center
Oceanfront <sup>4</sup>	0	0	0	City public facilities
Alternative 3 Totals	979	914	1,480 + shared	

\*The Convention Center currently has approximately 2,209 parking spaces in adjacent lots. The station would share parking with the Convention Center.

<sup>1</sup>Approximate spaces based off aerials and field observations.

<sup>2</sup>Required spaces based on 2034 ridership forecast.

<sup>3</sup>Number of spaces is approximate and may change during final design.

<sup>4</sup>Walk-Up station, no parking provided

Source: Fitzgerald & Halliday, 2014

For the Hilltop East Station, parking would be provided on the site of the Virginia Beach City Public Schools’ Laskin Road Annex at the southeast corner of Laskin Road and Winwood Drive. This site is approximately 650 feet east of the station platform and would be linked to the station with a paved sidewalk. As many as 250 spaces could be provided on the proposed site, with a projected parking demand of 45 spaces.

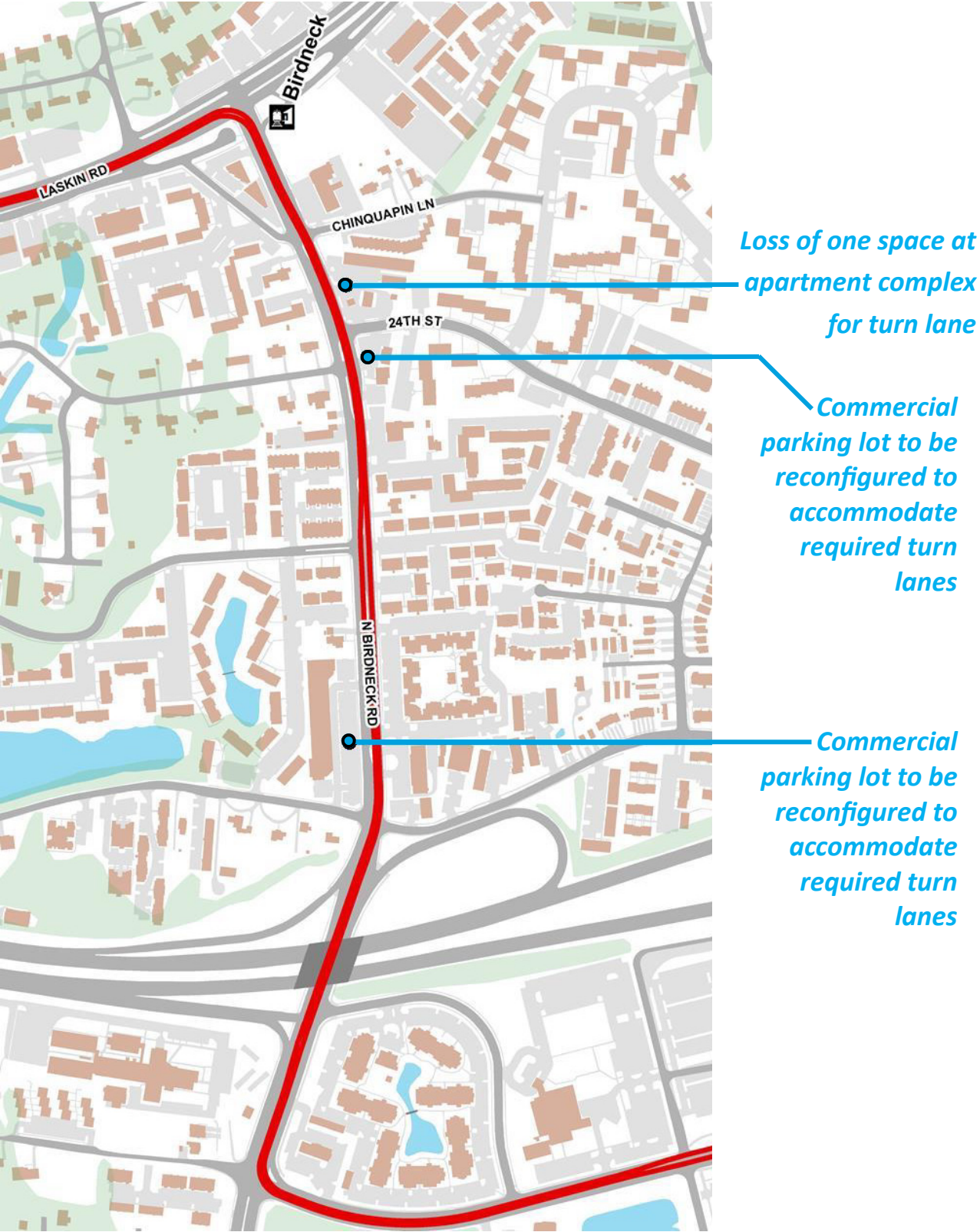
At the Birdneck Station, a Park & Ride lot is proposed for the southeast corner of the Laskin Road/Birdneck Road intersection. The proposed site consists of two adjoining parcels. One parcel is a vacant lot that was previously the site of a gas station, and the other is a vacant former restaurant building with a paved parking lot with approximately 130 spaces. Approximately 150 spaces could be provided on the site, which would be accessed from Laskin Road. The forecasted demand for parking at this site is approximately 83 spaces.

Roadway widening on Birdneck Road to accommodate the LRT guideway and turn lanes would affect parking on private property adjacent to the roadway (See **Figure 3.3-5**). Part of the parking lot for an apartment building on the southeast corner of Birdneck Road and Chinquapin Lane would be affected by widening Birdneck Road south of the Birdneck Station; one space in that parking lot would be removed. Widening of Birdneck Road to accommodate the LRT guideway and turn lanes at the 24<sup>th</sup> Street intersection would affect parking spaces that serve the property on the southeast corner; however, reconfiguring the parking lot on the property would result in no net loss of spaces. The parking lot for the Birdneck Shoppes shopping center on the west side of Birdneck Road would be reconfigured to accommodate the guideway and left turn lanes at a new signalized intersection serving that shopping center and the south entrance of the Sea Pines Apartments (Maximus Square). This would require removing approximately 17 parking spaces. As a result, there would be a net loss of 18 spaces for all private properties along Birdneck Road.

Parking for the Convention Center Station in Alternative 3 would use existing Convention Center parking lots as previously described for Alternative 2. Under Alternative 3, a parking demand of 77 spaces is projected for transit use at this station.



Figure 3.3-5 | Birdneck Road Proposed Parking Changes (Alternative 3)



Source: HDR, 2014

The City’s planned improvements on 19<sup>th</sup> Street east of Parks Avenue are expected to be constructed for Alternative 3 in the same manner as Alternative 2. The existing on-street parking on 19<sup>th</sup> Street between Baltic Avenue and Arctic Avenue would also be removed under Alternative 3.

The Oceanfront Station would be the same as with Alternative 2. However, unlike Alternative 2, the ridership model predicts no transit parking demand at the Oceanfront Station for Alternative 3. The 2034 ridership model projects that transit users have a different arrival preference at this station based on the alignment route for Alternative 3, and all of the passengers boarding would be from walk-ups or transfers. In addition, the City is building an approximately 800 space public parking garage north of the station. Both the new garage and other existing public parking facilities in the Oceanfront Resort Area would be available to transit users.

**BRT Build Alternatives**

The BRT build alternatives include the same station and Park & Ride facility locations as the corresponding LRT Alternatives. The parking demand varies between the BRT and LRT alternatives because of differences in forecast ridership. Impacts to private parking would differ due to BRT operations in mixed traffic at the eastern end of the alignments. These impacts are described in the following sections.

**ALTERNATIVE 1A: Town Center Alternative**

The BRT Alternative 1A stations at Witchduck and Town Center would be in the same locations as the LRT stations. The lower ridership forecasted for the BRT alternative reduces the parking demand at these stations. **Table 3.3-7** lists the existing number of spaces at each site, projected demand, and proposed number of spaces based on the conceptual station area designs.

Table 3.3-7 | BRT Alternative 1A Parking Summary

Station	Existing (Current) Park- ing Spaces on Site <sup>1</sup>	Projected Station Parking Demand <sup>2</sup>	New Station Parking Proposed <sup>3</sup>	Proposed Parking Use
Witchduck	40	101	250	Transit only
Town Center (all station options)	209	217	230	Transit only
Alternative 1A Totals	249	318	480	

<sup>1</sup>Approximate spaces based off aerials and field observations.

<sup>2</sup>Required spaces based on 2034 ridership forecast.

<sup>3</sup>Proposed number of spaces is approximate and may change during final design.

Source: Fitzgerald & Halliday, 2014

ALTERNATIVE 1B: Rosemont Alternative

The BRT Alternative 1B stations at Witchduck, Town Center, and Rosemont would be in the same locations as the LRT stations. The lower ridership forecasted for the BRT alternative reduces the parking demand at these stations. **Table 3.3-8** lists the existing number of spaces at each site, projected demand, and proposed number of spaces based on the conceptual station area designs.

ALTERNATIVE 2: NSRR Alternative

For the BRT Alternative 2, stations would be placed in the same locations as the LRT Alternative 2. Park & Ride lots would be placed near all of the stations on the former NSRR ROW, while the Convention Center Station would share the existing Convention Center parking areas, and the Oceanfront Station would continue not to have designated parking specifically for transit use. A summary of the parking at BRT stations under Alternative 2, including changes in demand because of forecasted ridership, can be found in **Table 3.3-9**.

ALTERNATIVE 3: Hilltop Alternative

Similar to the other alternatives, the BRT Alternative 3 would serve stations in the same areas as the LRT Alternative 3. Park & Ride lots would be located at the stations on the former NSRR ROW and at the Great Neck, Hilltop East, and Birdneck Stations. The Convention Center Station and Oceanfront Station would have the same kind of parking arrangements as the LRT Alternative 3. **Table 3.3-10** shows a summary of the parking provided and forecasted demand at each BRT station.

On Birdneck Road, the BRT Alternative 3 would run in mixed traffic within the existing roadway. Because no roadway widening is anticipated, there would be no impacts to parking on private property except for the Birdneck Station Park & Ride.

Table 3.3-8 | BRT Alternative 1B Parking Summary

Station	Existing (Current) Parking Spaces on Site <sup>1</sup>	Projected Station Parking Demand <sup>2</sup>	New Station Parking Proposed <sup>3</sup>	Proposed Parking Use
Witchduck	40	66	250	Transit only
Town Center (all station options)	209	91	230	Transit only
Rosemont	0	168	175	Transit only
Alternative 1B Totals	249	325	655	

<sup>1</sup>Approximate spaces based off aerials and field observations.

<sup>2</sup>Required spaces based on 2034 ridership forecast.

<sup>3</sup>Proposed number of spaces is approximate and may change during final design.

Source: Fitzgerald & Halliday, 2014

Table 3.3-9 | BRT Alternative 2 Parking Summary

Station	Existing (Current) Parking Spaces on Site <sup>1</sup>	Projected Station Parking Demand <sup>2</sup>	New Station Parking Proposed <sup>3</sup>	Proposed Parking Use
Witchduck	40	72	250	Transit only
Town Center (all station options)	209	98	230	Transit only
Rosemont	0	113	175	Transit only
Lynnhaven	180	104	175	Transit only
North Oceana	0	28	275	Transit only
Convention Center	*	77	0	Transit and Convention Center
Oceanfront <sup>4</sup>	0	4	0	City public facilities
Alternative 2 Totals	429	496	1,105 + shared	

\*The Convention Center currently has approximately 2,209 parking spaces in adjacent lots. The station would share parking with the Convention Center.

<sup>1</sup>Approximate spaces based off aerials and field observations.

<sup>2</sup>Required spaces based on 2034 ridership forecast.

<sup>3</sup>Number of spaces is approximate and may change during final design.

<sup>4</sup>Walk-up station, no parking provided

Source: Fitzgerald & Halliday, 2014

Table 3.3-10 | BRT Alternative 3 Parking Summary

Station	Existing (Current) Parking Spaces on Site <sup>1</sup>	Projected Station Parking Demand <sup>2</sup>	New Station Parking Proposed <sup>3</sup>	Proposed Parking Use
Witchduck	40	77	250	Transit only
Town Center (all station options)	209	98	230	Transit only
Rosemont	0	109	175	Transit only
Lynnhaven	180	92	175	Transit only
Great Neck	420	36	250	Transit only
Hilltop West <sup>4</sup>	0	44	0	Shopping centers / businesses
Hilltop East	0	29	250	Transit only
Birdneck	130	54	150	Transit only
Convention Center	*	41	0	Transit and Convention Center
Oceanfront <sup>4</sup>	0	0	0	City public facilities
Alternative 3 Totals	979	580	1,480 + shared	

\*The Convention Center currently has approximately 2,209 parking spaces in adjacent lots. The station would share parking with the Convention Center.

<sup>1</sup>Approximate spaces based off aerials and field observations.

<sup>2</sup>Required spaces based on 2034 ridership forecast.

<sup>3</sup>Number of spaces is approximate and may change during final design.

<sup>4</sup>Walk-up station, no parking provided

Source: Fitzgerald & Halliday, 2014

3.3.5 Construction Impacts

Existing public or private parking facilities may be affected during the construction of any of the LRT or BRT build alternatives. Construction activities that would occur adjacent to parking lots may require temporary easements to provide additional space to install the LRT tracks, BRT guideway, other system elements, sidewalks, or roadway improvements associated with construction of the transit system. The locations of parking areas affected during construction will be identified during final design. In most cases, the affected parking would be limited to the area immediately adjacent to construction, and most parking lots have a surplus of parking spaces that can absorb a short-term loss of use of a small portion of the lot. These impacts are temporary in nature, and the parking areas would be restored to their owners upon completion of the work. A construction management plan would be developed during final design to identify the impacts of construction activities and potential mitigation strategies.

3.3.6 Indirect Effects

The traffic analysis, as identified in the Roadway and Traffic section, included area traffic projections to account for average daily demand. While an increase in parking supply and improvements to station access would increase traffic demand, particularly at VBTES Corridor area intersections near the stations, traffic congestion and long delays at the intersections are attributed primarily to growth from future development.

Development and redevelopment activities around the study area intersections and stations could increase the demand for public and private parking. These activities, however, would be subject to the City of Virginia Beach planning review and zoning code requirements. The level of impacts would depend on the details of the future development and implementation of City requirements regarding the size of parking facilities and methods of access to serve those properties.

3.3.7 Avoidance, Minimization, and Mitigation

The parking facilities considered for the LRT and BRT build alternatives are intended to improve accessibility to the transit stations, minimize impacts to automobile traffic, and increase pedestrian and vehicle safety. Parking facilities in most locations within the City would not be adversely affected by construction of the build alternatives. The combined number of spaces at all proposed Park & Ride lots under each alternative would meet the total demand projected to be generated by patrons who would park at a station and ride the transit system, so it would be likely that other stations would have parking available in the event that one particular facility may be full.

At the Town Center (Alternative 1A), Rosemont (Alternatives 1B, 2, and 3) and Hilltop West (Alternative 3) Stations, where parking demand may exceed proposed supply, HRT and the City would initiate a dialogue for shared parking arrangements with nearby property owners with potentially available parking space. Additionally, the effect of diverting drivers to other stations will be examined in future updates of the ridership forecasts.

An agreement for use of the Convention Center lots would be made between HRT and the City of Virginia Beach to allow shared use of the existing lots by transit patrons. If necessary, restrictions can be placed on transit parking in these lots when there is an event at the Convention Center that will require its full capacity. However, it is anticipated that event participants using the transit system instead of driving would likely offset any transit parking demand during events.

The loss of on-street parking on 19<sup>th</sup> Street as part of the City’s planned improvement project would be offset by the City’s planned parking garage north of 19<sup>th</sup> Street, which would further increase the parking supply in the Oceanfront Resort Area. Thus, there is minimal overall effect to available parking from the build alternatives.

Generally, where existing private parking facilities would be removed, the commercial or retail establishment that the parking served would also be displaced (See Section 4.3 for

a discussion of acquisitions and displacement impacts). Although a small number of commercial parking spaces would be lost along Birdneck Road, it is anticipated that parking at the Birdneck Station would be available for shared parking on most days. The Birdneck Station is within a one-third mile walking distance of the affected properties, thereby potentially reducing demand for parking at those locations due to potential mode shift to transit. Additional coordination will be required between HRT, the City, and the affected property owners.

3.4 Bicycle and Pedestrian Facilities

3.4.1 Legal and Regulatory Context

The City of Virginia Beach established a *Bikeways and Trails Plan* in 2011 as an addendum to its 2009 Comprehensive Plan and Master Transportation Plan. The 2011 *Bikeways and Trails Plan* calls for an enhanced system of bikeways and trails throughout the City, plus programs and other initiatives that support their use. **Figure 3.4.1** (on the following page) shows the City’s planned expansion of its bikeways and trails system in the vicinity of the VBTES Corridor. The 2011 *Bikeways and Trails Plan* has identified a shared use path along the former NSRR ROW corridor as a top priority.

The plan calls for the City to conduct a feasibility analysis to determine the extent, if any, to which bike facilities can be reasonably accommodated in any transportation project. The City’s feasibility analysis is to be conducted when the project “becomes active”. According to the plan, such an analysis is to consider costs, availability of funding, impacts to adjacent private properties (e.g., additional property acquisition for bike facilities, potential for damages associated with the acquisition, and changes to access to property), impacts to public and private utilities, and other pertinent factors. The analysis will be documented and will be the basis for establishing what, if any, bike or trail facilities may be developed in conjunction with the transportation project.

The City has initiated a study to examine the feasibility of incorporating a shared use path adjacent to a transit guideway in the former NSRR ROW. While this study is ongoing, a draft report has been prepared and can be found in **Appendix S** of this DEIS.

3.4.2 Methodology

Existing sidewalk and trail crossings within the VBTES Corridor were identified using aerial photography, survey information, and field observations. The conceptual engineering design drawings were used to identify locations where impacts to existing crossings may occur. The final design of each crossing will be determined following a detailed engineering study.

3.4.3 Existing Conditions

The VBTES Corridor includes an array of paved and unpaved paths, sidewalks, and trails adjacent to existing roadways. Widths and paving materials, if any, vary among the facilities. There is no existing path or trail within or parallel to the former NSRR ROW.

**Table 3.4-1** (on page 3-24) lists the locations of existing sidewalks and paths that intersect with the project’s alternatives.



Figure 3.4-1 | Virginia Beach Bikeways and Trails



Source: City of Virginia Beach Bikeways and Trails Plan, 2011



Table 3.4-1 | Roadways with Existing Sidewalks Intersecting VBTES Alternatives

Sidewalk Crossing Location	ALTERNATIVE(s)			
	1A	1B	2	3
Princess Anne Road	●	●	●	●
Witchduck Road	●	●	●	●
Kellam Road	●	●	●	●
Independence Boulevard	●	●	●	●
Constitution Drive	●	●	●	●
Lynn Shores Drive		●	●	●
Rosemont Road			●	●
South Plaza Trail			●	●
Lynnhaven Parkway			●	●
London Bridge Road			●	●
Oceana Boulevard			●	
Birdneck Road/former NSRR ROW			●	
Birdneck Road/Virginia Beach Boulevard			●	
19 <sup>th</sup> Street/LRT guideway			●	
19 <sup>th</sup> Street/Parks Avenue			●	●
19 <sup>th</sup> Street/Cypress Avenue			●	●
19 <sup>th</sup> Street/Mediterranean Avenue			●	●
19 <sup>th</sup> Street/Baltic Avenue			●	●
Virginia Beach Boulevard/Great Neck Road				●
Laskin Road/Regency Hilltop Shopping Center				●
Laskin Road/Regency Drive				●
Laskin Road/Republic Road				●
Laskin Road/Hilltop Plaza Shopping Center				●
Laskin Road/First Colonial Road				●
Laskin Road/Hilltop North Shopping Center				●
Laskin Road/Hilltop East Shopping Center				●
Laskin Road/Birdneck Road				●
Birdneck Road/24 <sup>th</sup> Street				●
Birdneck Road/Waterfront Drive/Marabou Lane				●
Birdneck Road/Old Virginia Beach Road				●
Birdneck Road/19 <sup>th</sup> Street				●
19 <sup>th</sup> Street/Jefferson Avenue				●
19 <sup>th</sup> Street in front of Convention Center (Mid-block crossings)				●

Source: HDR, 2014

3.4.4 Environmental Impacts

No Build Alternative

Under the No Build alternative, the VBTES project would not be undertaken. Future development projects will be required to meet City site planning, building, and zoning codes for inclusion of sidewalks, bicycle paths, and/or trails. City transportation projects will continue to undergo a feasibility analysis for potential inclusion of bikeways, trails, or sidewalks in accordance with the 2011 *Bikeways and Trails Plan*.

Build Alternatives

Roadway crossings of the BRT or LRT guideway and other project-related roadway upgrades would include enhancements for pedestrian and bicycle safety. These new enhancements would be tied into existing pedestrian infrastructure (sidewalks) where possible. All pedestrian walkways would be designed in accordance with City of Virginia Beach standards and the Americans with Disabilities Act (ADA). The details of specific pedestrian and bicycle enhancements would be determined during future phases of design. In general, pedestrian crossings of the guideway can be categorized by their location: along the former NSRR ROW, along local streets from Birdneck Road east to the Oceanfront Station, along Laskin Road, and at station areas.

Within the former NSRR ROW in Alternatives 1A, 1B, 2, and 3, at-grade crossings of the LRT alignment would have railroad-style signals with flashing lights and a wayside signal bell to provide warning in advance of the crossing, while at-grade crossings of the BRT alignment would be protected with traffic signals. While gates would be installed at LRT and BRT crossings to block roadway traffic, including bicycles that ride in the street, gates would not typically be placed across sidewalks or shared use paths. Passive pedestrian warning signs would be posted, and ADA-compliant detectable warning tiles would be installed in sidewalks at each crossing. Fences would be placed along the right of way to discourage people from entering the guideway between crossings and direct them to designated crossings. **Figure 3.4-2** shows an example of the pedestrian treatments adjacent to a roadway crossing.

Figure 3.4-2 | Example Crossing Treatment Adjacent To Roadway Crossing



Source: HDR, 2014

Figure 3.4-3 | Example Crossing Treatment in Urban Context



Source: HDR, 2014

Figure 3.4-4 | Example Crossing Treatment for LRT in Arterial Median



Source: HDR, 2014

LRT Alternatives 2 and 3 would operate in an exclusive guideway in the median or to the side of the street along Birdneck Road, Virginia Beach Boulevard, and 19<sup>th</sup> Street to the Oceanfront Station. The LRT vehicles are expected to run at 25 miles per hour or less through this area, and intersections that the guideway crosses would be controlled by standard traffic signals. These signalized intersections would also accommodate pedestrians by including crosswalks, standard pedestrian signal heads, and separate phases in the signal timing. Pedestrian fences or barriers such as bollards and chains may be used in some locations to discourage mid-block crossings and direct pedestrians to signalized intersections. BRT Alternatives along these streets would operate in mixed traffic similar to any other vehicle under existing conditions; therefore, no additional treatment for pedestrian crossings is anticipated in this area. **Figure 3.4-3** shows an example of the pedestrian treatments for these more urban types of crossings.

Laskin Road between Phillip Avenue and Birdneck Road would be reconstructed as part of Alternative 3 LRT and BRT. The reconstruction of Laskin Road would include new sidewalks on both sides of the roadway, even in areas that currently do not have sidewalks. Intersections with at-grade crossings of the guideway would have standard traffic signals, signs, and crosswalks. Pedestrian call buttons, signal heads and signal phases would be incorporated with the traffic signal design at all intersections. Where appropriate, there would be space between the LRT/BRT guideway and the Laskin Road travel lanes for pedestrians or bicyclists to wait safely if they are unable to cross the street in the time provided by the traffic signal. Gates would not be installed at pedestrian crossings, but fences or other barriers would be used as needed to discourage mid-block crossings and to direct pedestrians to cross at signalized intersections. **Figure 3.4-4** shows an example of the pedestrian treatments that may be used for these types of crossings.

The design of the proposed station areas would include sidewalks and paths to connect nearby streets, bus transfer areas, and park & ride lots to the station platforms. At-grade crossings of the LRT or BRT guideway at stations would include signs, pavement markings, and detectable warning tiles at each location, similar to the existing crossings at stations on The Tide. An example of a

pedestrian crossing at a station is shown in **Figure 3.4-5**. All new stations would be equipped with bicycle racks near the platforms. Additional information about station areas can be found in **Chapter 2**.

Bicycles are currently allowed on The Tide. Each light rail vehicle in HRT’s existing fleet has a bicycle storage hanger, and most stations have a bicycle rack near the platform. It is anticipated that bicycles would be permitted on an LRT extension or a BRT system in Virginia Beach as well, and new vehicles that are procured would include provisions for on-board bicycle storage.

Developing a parallel bikeway or shared use path adjacent to the build alternatives has been discussed with the City of Virginia Beach but is not a part of any conceptual designs that have been prepared for this DEIS. The City is in the process of determining the feasibility of such a path, and a draft of the study report is in **Appendix S**. If the City of Virginia Beach chooses to pursue construction of a shared use path along all or part of the selected transit alternative, further coordination between the City and HRT would take place during the FEIS.

**Figure 3.4-5 | Example Crossing Treatment at LRT Station**



Source: HDR, 2014

**3.4.5 Construction Impacts**

During construction, there may be temporary effects to sidewalks or bicycle facilities, including temporary closures for safety reasons and to allow for the guideway or road construction to take place in localized areas such as at grade crossings. These impacts are anticipated to be minor and would not cause long-term disruption to pedestrian or bicycle activity. Mitigation may include sidewalk detours, signage, fencing, or other barriers to separate pedestrians and bicyclists from construction activities and other potential hazards.

**3.4.6 Indirect Effects**

The construction of the build alternatives may result in an increase in the number of bicycles and pedestrians along existing streets leading to the station areas. Widening sidewalks/multi-use paths may be required to accommodate this increase in non-motorized traffic. New pedestrian signals, crosswalks, and other accommodations outside of the immediate vicinity of the project may be required depending on how successful the build alternative is in attracting pedestrians and bicyclists.

**3.4.7 Avoidance, Minimization, and Mitigation**

There are no permanent impacts to sidewalks or bicycle facilities anticipated as a result of any of the build alternatives, so no mitigation would be required. Where the build alternatives intersect with pedestrian crossings, standard signs, crossing signals, and detectable warning tiles embedded in the sidewalks would be installed as per City and state standards. Fencing or other barriers such as bollards and chains may be used to direct pedestrians to designated crossings. The details of pedestrian and bicycle crossings, including fence locations, would be developed during the final design.





# Chapter 4 | Social Effects

Chapter 4





4.0 Social Effects

Chapter 4.0 evaluates the effects of the No Build and build alternatives on the social environment of the VBTES Corridor. Sections in this chapter include: Land Use (Section 4.1), Economic Development (Section 4.2), Acquisitions and Displacements (Section 4.3), Cultural Resources (Section 4.4), Parklands and Recreation Areas (Section 4.5), Visual Quality (Section 4.6), Safety and Security (Section 4.7), and Community Facilities (Section 4.8).

4.1 Corridor-Level Land Use

This section describes the land use patterns in the VBTES Corridor and the potential effects of the build alternatives. Additionally, this section considers the current land use patterns and future land use plans of the VBTES Corridor.

4.1.1 Legal and Regulatory Context

Existing land use and future development patterns in the City of Virginia Beach and the VBTES Corridor are controlled through the City of Virginia Beach Comprehensive Plan, the comprehensive master plans for the City’s strategic growth areas, and the City’s zoning ordinance. The content and form of these plans and ordinances are guided by the Code of Virginia. Table 4.1-1 lists the local plans for land development in the VBTES Corridor.

City of Virginia Beach Comprehensive Plan

The City of Virginia Beach Comprehensive Plan, adopted in 2009, describes the overall vision for future growth in the City. Among the sections of the City’s comprehensive plan are those that address urban, suburban, and rural areas. The comprehensive plan addresses the urban environment by identifying areas within the City designated to accommodate future development through incorporating mixed-uses and higher densities. Planning objectives for suburban and rural areas are also outlined, which focus on maintaining neighborhood quality and environmental protection.

The City of Virginia Beach updated its citywide comprehensive plan in 2003 and with it introduced the Strategic Growth Area (SGA) planning model. SGAs are portions of the City where future residential, commercial, and light industrial development is planned to be

Table 4.1-1 | Locally Adopted Land Use Plans

Planning Document	Year Adopted
Oceanfront Resort Area Strategic Growth Area Master Plan	2008
City of Virginia Beach Comprehensive Plan	2009
Pembroke Strategic Growth Area Master Plan	2009
Newtown Strategic Growth Area Master Plan	2010
Rosemont Strategic Growth Area Master Plan	2011
Hilltop Strategic Growth Area Master Plan	2012
Lynnhaven Strategic Growth Area Master Plan	2012

Source: City of Virginia Beach, 2013

concentrated to create attractive activity nodes where people would live, work, and play. The SGAs are intended to create areas with denser concentrations of residential uses, greater mixes of different uses, and broader choices of alternative transportation modes. Eight SGAs were identified in the City; six are located along the I-264/Virginia Beach Boulevard corridor. The 2009 comprehensive plan identified the I-264/Virginia Beach Boulevard corridor for a fixed guideway system.

Additionally, the City of Virginia Beach Comprehensive Plan addresses the need for improved multimodal transportation options by providing the framework for the implementation of a fixed guideway transit system and a citywide cycling and pedestrian network.

SGA Master Plans

Master Plans have been adopted for the eight SGAs within the City of Virginia Beach, including the six along the VBTES Corridor: Newtown, Pembroke, Rosemont, Lynnhaven, Hilltop, and Resort. A map of these six Strategic Growth Areas can be found in Figure 1.4-2. These SGAs contain critical commercial and employment centers that serve

residents citywide. All of the master plans for these six SGAs, adopted between 2008 and 2012, call for extending light rail transit from The Tide’s Newtown Road Station to the Oceanfront Resort Area. The plans also recommend establishing transit-oriented development along the axis of the former NSRR ROW.

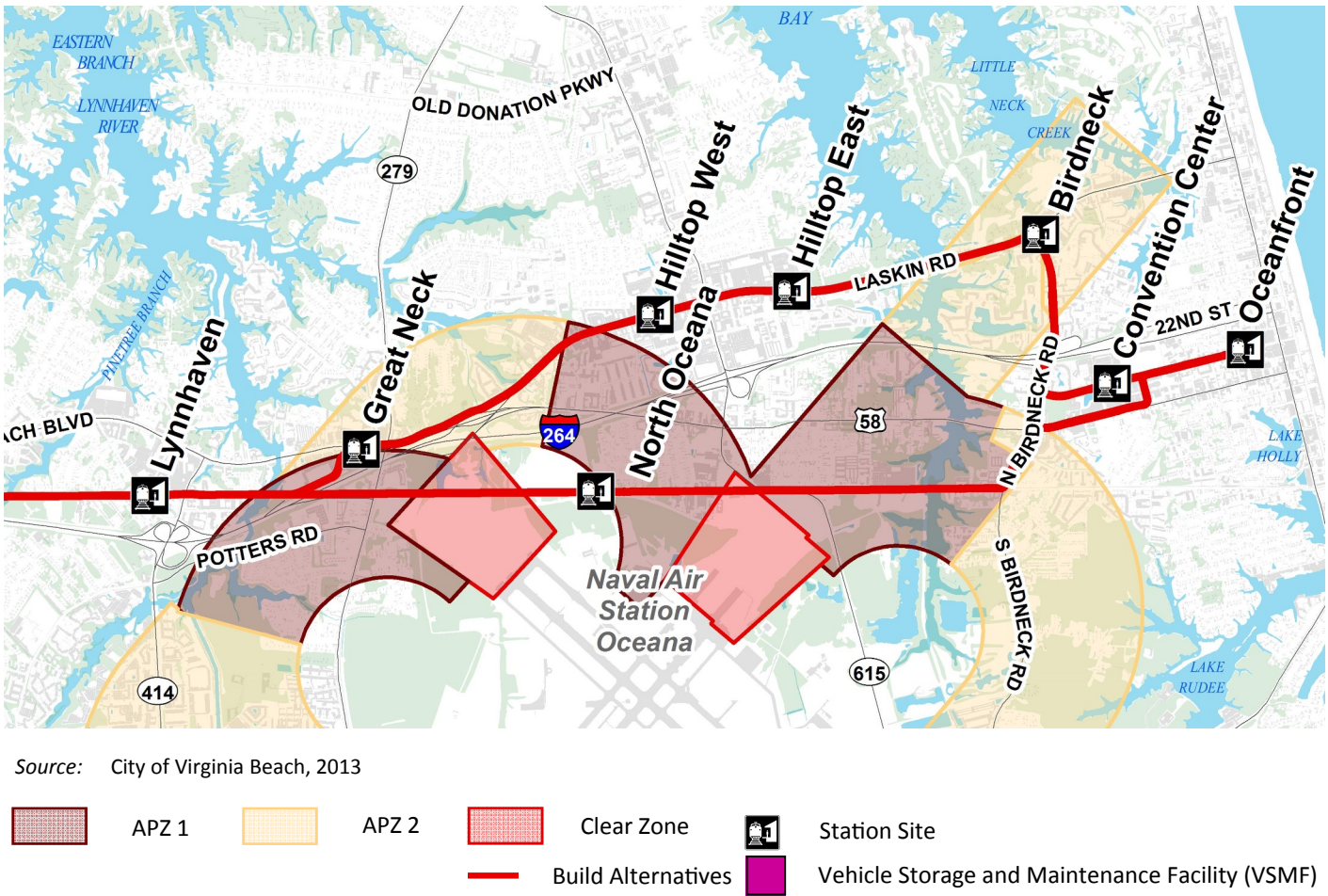
City of Virginia Beach Zoning Ordinance

The City’s Zoning Ordinance (Appendix A of the City Code) regulates the permitted form, function, and uses of land within its boundaries. The City’s zoning ordinance acknowledges the flexibility required to implement the adopted SGA master plans and reflects the inclusion of some revised land use classifications that permit mixed-use, higher density, and transit-oriented development along with supportive urban design guidelines. New zoning classifications amended into the zoning ordinance are

OR-Oceanfront Resort District, which outlines a form-based approach guiding future growth and urban design in the Resort SGA and B-3A, Pembroke Central Core Business District, which stipulates building heights and facilitates mixed-use development within the Town Center of Virginia Beach area.

The City’s zoning code also imposes special development restrictions around NAS Oceana in response to Air Installation Compatibility Use Zones (AICUZ). The AICUZ-based zoning restrictions limit the type, density, and height of development allowed within safety zones around NAS Oceana. The AICUZ zones include a Clear Zone and Accident Potential Zones 1 and 2 (APZ-1 and APZ-2). Figure 4.1-1 shows the boundaries of the Clear Zone and APZ-1 and APZ-2 areas. Each zone has specific land use restrictions that are based on accident potential levels, with Clear Zones being

Figure 4.1-1 | AICUZ Boundaries for NAS Oceana



Source: City of Virginia Beach, 2013

the most limited and the APZ-1 zone the second most limited. AICUZ – based zoning restrictions are in place for portions of the VBTES Corridor in the Lynnhaven and Hilltop SGAs. Tables describing compatible land uses in AICUZ areas can be found in Article 18 of the Virginia Beach Zoning Ordinance.

#### 4.1.2 Methodology

Land use impacts were assessed using ArcGIS and spatial data provided by the City of Virginia Beach. As part of this approach, zoning data was analyzed to understand existing land use patterns, with particular attention focused on the types and amount of residentially zoned land. Development restrictions detailed in the City’s zoning ordinance or through other regulatory components, such as AICUZ regulations around NAS Oceana, were also incorporated into the land use analysis. Finally, the City’s comprehensive plan and SGA master plans were applied to further evaluate land use patterns.

#### 4.1.3 Existing Conditions

The VBTES Corridor is located in the City of Virginia Beach’s primary east-west transportation corridor. It extends approximately 11 miles from the eastern terminus of The Tide at Newtown Road eastward to the Oceanfront Resort Area. The VBTES Corridor is the commercial spine of the City. Land uses are a mixture of commercial, institutional, light industrial, and single-family and multi-family residential. The VBTES Corridor was developed in suburban strip fashion, consisting of mostly auto-oriented, low-density development. Residential neighborhoods and NAS Oceana are the primary land uses north and south of the VBTES Corridor. Recent development at the Town Center of Virginia Beach has incorporated mixed-use and higher density land uses not typical of the VBTES Corridor.

##### *Newtown Road Station to the Proposed Town Center Station along the Former NSRR ROW (Alternatives 1A, 1B, 2, and 3)*

This segment extends from The Tide’s Newtown Road Station along the former NSRR ROW east to the proposed Town Center station. This segment passes through the Newtown and Pembroke SGAs.

The Newtown SGA is bounded by the Norfolk/Virginia Beach border at Newtown Road on the west and I-264 on the east. Land use patterns in the area consist of low-density commercial and light industrial uses, as well as some single-family and multi-family residential units. Surrounding residential neighborhoods are characterized by low-density, single-family housing largely constructed during the 1950’s through the 1970’s. The established housing stock in the Arrowhead, Huntington, and Fair Meadows neighborhoods are primarily mid-sized dwellings with three to four bedrooms. The composition of multi-family housing in these neighborhoods is limited and consists mostly of townhomes.

Development patterns begin to change approaching the Pembroke SGA and the Town Center of Virginia Beach. The Pembroke SGA is directly east of the Newtown SGA and is generally bound by Clearfield Avenue and I-264 to the west, Thalia Creek to the east, Jeanne and Broad Streets to the north, and Bonney and Baxter Roads to the south. The Pembroke SGA includes some commercial, institutional, residential, and light industrial land uses. The Pembroke SGA also includes the Town Center of Virginia Beach, a large -scale mixed-use development incorporating office, retail, residential, educational, entertainment, cultural, restaurant, open space, and other uses. The Town Center of Virginia Beach is the central business district (CBD) of the City of Virginia Beach.

The residential neighborhoods adjacent to the Pembroke SGA, including Pocahontas Village to the south and Pembroke Manor and Aragona Village to the north, have housing profiles similar to neighborhoods within the Newtown SGA. The housing stock is largely composed of mid-sized, single-family dwellings constructed between 1940 and 1960.

##### *Proposed Town Center Station to the Proposed Rosemont Station along the Former NSRR ROW (Alternatives 1B, 2, and 3)*

East of the Pembroke SGA and the Town Center of Virginia Beach, land uses transition to more typical suburban development patterns with residential uses to the north and south, mixed with auto-centric commercial uses. The

Rosemont SGA, a 158-acre area spanning Virginia Beach Boulevard, is along this section. The Rosemont SGA is characterized by suburban strip commercial development along Virginia Beach Boulevard, light industrial uses along Bonney Road to the south, and single-family neighborhoods.

Commercial development in this segment consists of retail businesses that provide a variety of services. Commercial buildings are designed as single and multi-tenant structures set back from Virginia Beach Boulevard with large surface parking lots adjacent to the roadway. To the south of Virginia Beach Boulevard and north of Bonney Road, the Thalia Village community has higher density with a mix of housing types, including single-family and multi-family dwellings.

##### *East of the Proposed Rosemont Station to East of London Bridge Creek along the Former NSRR ROW (Alternatives 2 and 3)*

East of the proposed Rosemont Station, the former NSRR ROW continues through the western half of the Lynnhaven SGA. The Lynnhaven SGA is centered on Lynnhaven Parkway and is bounded by I-264, London Bridge Creek, and Potters Road to the south, Laskin Road and Upper Wolfsnare Plantation to the east, parcels immediately north of Virginia Beach Boulevard to the north, and the Rosemont SGA to the west. The Lynnhaven SGA is largely characterized by suburban commercial and light industrial strip development along the arterial road network. Development within the Lynnhaven SGA is impacted by compatible use restrictions associated with NAS Oceana (previously shown in **Figure 4.1-1**). The residential pattern of the Lynnhaven SGA is limited, and is predominantly low-density residential development characterized by single-family detached homes.

Residential neighborhoods adjacent to the Lynnhaven SGA maintain the low-density character of this area. The Lynnhaven Woods, Eastern Park, and Nottingham Estates communities are part of or adjacent to the Lynnhaven SGA and primarily include single-family neighborhoods. The Oconee Park neighborhood includes townhomes and mobile homes and is east of London Bridge Creek.

##### *East of London Bridge Creek to the Proposed Oceanfront Station via the Former NSRR ROW – 17th Street – 19th Street (Alternative 2)*

East of London Bridge Creek, this segment continues through the remainder of the Lynnhaven SGA with a similar development pattern as noted in the previous section. The segment then continues on the former NSRR ROW passing north of NAS Oceana. Potential development is limited in this segment between London Bridge Road and Birdneck Road because of its close proximity to NAS Oceana and existing AICUZ regulations. The communities of West Oceana and Oceana Gardens contain a mix of single-family homes built before 1970.

At Birdneck Road, the alignment would enter the Resort SGA. The Resort SGA is bounded approximately by 42nd Street and Laskin Road to the north, the Atlantic Ocean on the east, Birdneck Road on the west, and Owls Creek to the south. Land use is a mixture of high-density strip commercial development along the oceanfront, with lower-density, single-family residential housing moving west away from the oceanfront.

The Seatack neighborhood is the primary residential community along this portion of South Birdneck Road adjacent to the alignment. This neighborhood contains a mixture of single and multi-family residences, including apartments and townhomes.

##### *East of London Bridge Creek to the Proposed Oceanfront Station via Laskin Road – Birdneck Road- 19<sup>th</sup> Street (Alternative 3)*

Land uses along the Laskin Road corridor consist primarily of commercial properties with residential neighborhoods to the north and south. This segment initially passes through a commercial area at Great Neck Road and Virginia Beach Boulevard, as well as south of the Point O’ Woods residential neighborhood, and Chapel Lake Apartments. The housing profile in this area is primarily single-family residences, with multi-family dwellings in the Chapel Lake apartment complex and along Regency Drive.

Continuing east on Laskin Road, this segment passes through the Hilltop SGA and south of the Linlier neighborhood. The Hilltop SGA is among the largest

shopping areas within the City of Virginia Beach, with diverse retail and commercial establishments serving residents citywide and others from around the region. It is a largely suburban, strip development area that contains congested roadways and large surface parking areas. The established Linlier neighborhood, bounded by Laskin Road to the north, Linkhorn Bay to the east, and Virginia Beach Boulevard to the south, consists of single-family homes. The Chanticleer apartments, located south of Laskin Road (and within the Hilltop SGA) consists of multi-family apartments and townhomes. Most of the Hilltop SGA and Linlier neighborhood is located within a high noise zone, and the area south of I-264 is subject to greater AICUZ restrictions because of the presence of accident potential zones and the Clear Zone. These AICUZ restrictions limit the types and density of future growth in the area (see **Figure 4.1-1**).

Along Birdneck Road and 19<sup>th</sup> Street, the segment would pass adjacent to the Birdneck Acres community. Birdneck Acres contains a mixture of single-family and multi-family housing. There is a concentration of multi-family housing along Birdneck Road north of I-264, including the Mayfair Mews, Gleneagle, Birdneck North, Linkhorn Bay, and Sea Pines apartment communities. The final segment of Alternative 3 overlaps with the eastern segment of Alternative 2, transitioning onto 19<sup>th</sup> Street and traversing the mixed-use Resort SGA.

#### 4.1.4 Environmental Impacts

##### No Build Alternative

Under the No Build alternative, land use in the VBTES Corridor is expected to intensify, generally following the growth plans outlined in the City's comprehensive plan and component SGA master plans. These plans describe strategies for transitioning from low-density, suburban development into a higher density urban area. This would cause an increase in population and like influence a change in housing tenure from own-ownership to other occupancy type such as rentals. Using the existing transportation network and creating higher density nodes of development would decrease the amount of open space converted for future development and address livability standards through the creation of mixed-use districts that blend

residential and commercial services. Additionally, focusing the development of moderate and high density mixed-use centers in the six SGAs within the VBTES Corridor would help limit future sprawl by redirecting growth from peripheral arterials to along primary transportation routes. However, the No Build alternative lacks the incorporation of transit improvements necessary to achieve the envisioned transit-oriented, higher density mixed-use centers described in the City of Virginia Beach Comprehensive Plan and SGA master plans. Without transportation related concerns being addressed, such as traffic congestion and transit reliability, the higher density urban and mixed-use development vision outlined in citywide planning documents is unlikely to be achieved.

##### LRT Build Alternatives

The LRT build alternatives are consistent with the City's comprehensive plan and integral to many of the SGA master plans. The LRT build alternatives would have limited effect short term effect on demographics and existing land use because the VBTES Corridor is already developed and includes the urbanized areas of the City. Extending LRT from the Newtown Road Station east along the VBTES Corridor would encourage longer-term redevelopment called for in the City of Virginia Beach Comprehensive Plan and related SGA master plans, but it would not directly create the development. Other factors, such as market demand, existing property ownership and use, planned infrastructure modifications, and changing community vision and needs, would also affect the nature and pace of any change in land use within the VBTES Corridor and SGAs.

The direct land use impacts would occur due to street closures and partial property acquisition along localized areas of each alignment alternative and due to larger property acquisitions at Park & Ride lots around several of the proposed station areas. Traffic impacts are discussed in **Section 3.1** and property acquisitions and displacements are described in greater detail in **Section 4.3**.

##### ALTERNATIVE 1A: Town Center Alternative

Alternative 1A traverses two SGAs: Newtown and Pembroke. Future planning efforts recommend mixed-use development surrounding transit stations, integrating

office, institutional, light industrial, commercial, and residential land uses, as well as open space, depending on the SGA master plan. While Alternative 1A would support the objectives of adopted planning documents, changes to surrounding land uses would be limited. Considering Alternative 1A would operate exclusively within the former NSRR ROW, an already established transportation corridor, any land use changes would likely be focused around the proposed transit stations.

Two stations would be included along Alternative 1A with Park & Ride lots (Witchduck and Town Center). Neighborhoods in the vicinity of the stations proposed for Alternative 1A include Arrowhead, south of the Newtown SGA, and Pocahontas Village, south of the Pembroke SGA. Land use impacts and potential property acquisitions are primarily limited to the two proposed station areas, and the land use of the surrounding residential neighborhoods would not be impacted. Each of the proposed stations are important components of future planning efforts in the City of Virginia Beach and support the implementation of area plans that aim to integrate various transportation options and provide residents with a comprehensive, multimodal transportation network. **Figures 4.1-2 and 4.1-3** show the adopted master plan maps for the SGAs along Alternative 1A. The transit stations shown on the SGA plans were based on conceptual development vision planning and are not exactly those proposed in the VBTES.

Neighborhood specific impacts would be limited for Alternative 1A considering the alignment would remain in the former NSRR ROW. Where the alignment would travel near residences, specifically north of the Point O' View and Euclid neighborhoods, in the short-term the demographic profile would not likely be effected. Both neighborhoods are well established and fully built. Any direct impacts to the demographic characteristics of the VBTES Corridor under Alternative 1A would likely occur in the expanding Town Center of Virginia Beach, where multi-family and mixed-use development would support an increase in total population and population density.

##### ALTERNATIVE 1B: Rosemont Alternative

Alternative 1B would include all of the effects on land use from Newtown to the proposed Town Center Station as noted for Alternative 1A.

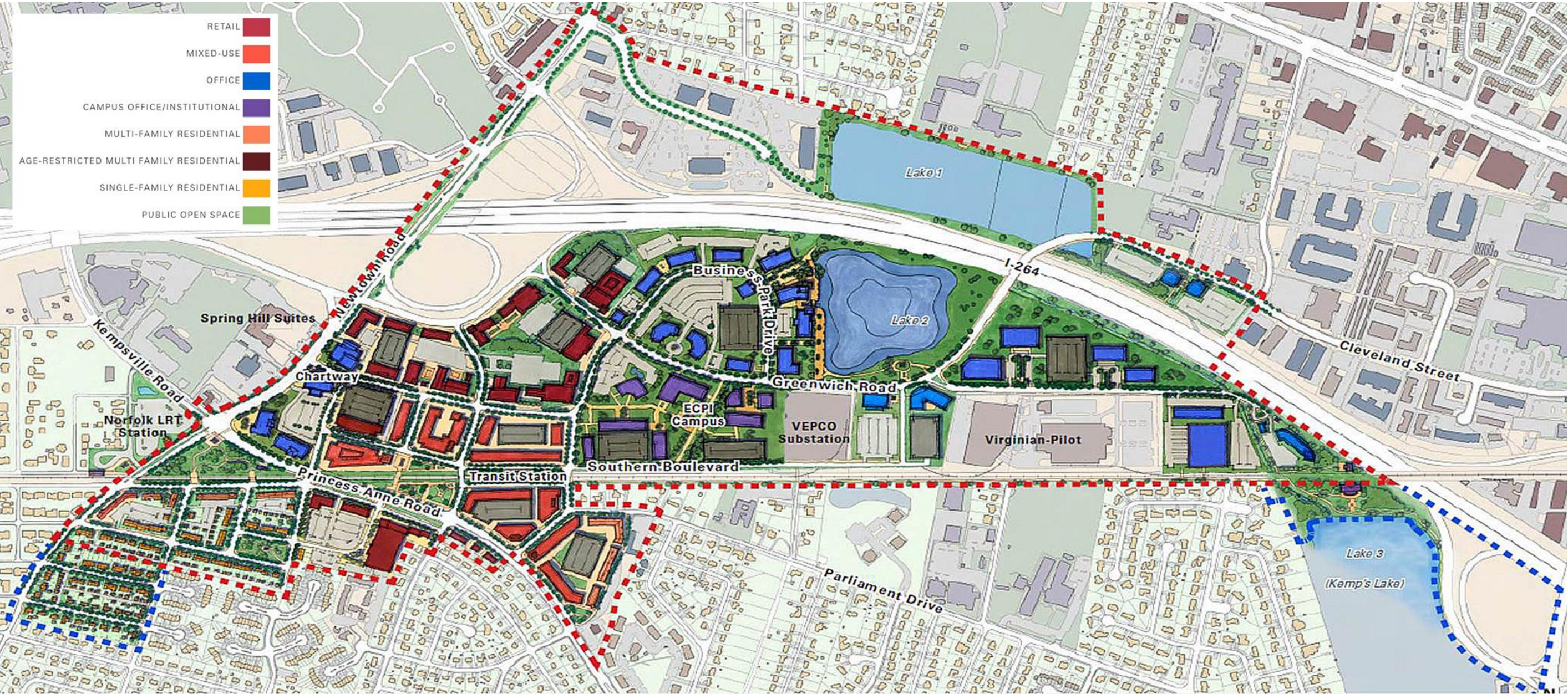
In addition to passing through the Newtown and Pembroke SGAs, Alternative 1B would provide access to the Rosemont SGA. Alternative 1B would also incorporate an additional station and accompanying Park & Ride serving the Rosemont SGA. The proposed station and Park & Ride would be located on currently vacant land at the intersection of Virginia Beach Boulevard and Lynn Shores Drive. Existing land uses within the Rosemont SGA include primarily auto-oriented commercial development and light industrial uses. **Figure 4.1-4** shows the master plan for the Rosemont SGA.

The communities adjacent to the Alternative 1B alignment have stable, established housing stock and limited land available for redevelopment limiting any direct short-term effects to corridor-level demographics under this alternative. The City's comprehensive plan outlines specific recommendations for maintaining neighborhood quality and environmental integrity and emphasizes the importance of community cohesion, quality of life, and creating and maintaining open spaces for recreation that would also limit longer-term demographic shifts. As part of this strategy to maintain neighborhood stability, the Strategic Growth planning model limits the impacts of future growth and development associated with fixed guideway transit.

Changes in land use are not expected to occur based on the proposed project, though residential neighborhoods along Alternative 1B would benefit from increased transportation options. If anticipated land use changes occur based on recommendations outlined in the SGA master plans, the commercial activity would likely increase in density within the established Newtown, Pembroke, and Rosemont SGA boundaries.

Within the Thalia neighborhood, Alternative 1B would close two closely-spaced streets at the tracks (Fir Street and Budding Street) to improve safety conditions. While the specific changes in traffic have not been modeled, it is

Figure 4.1-2 | Newtown SGA Master Plan Map



Source: City of Virginia Beach, 2009



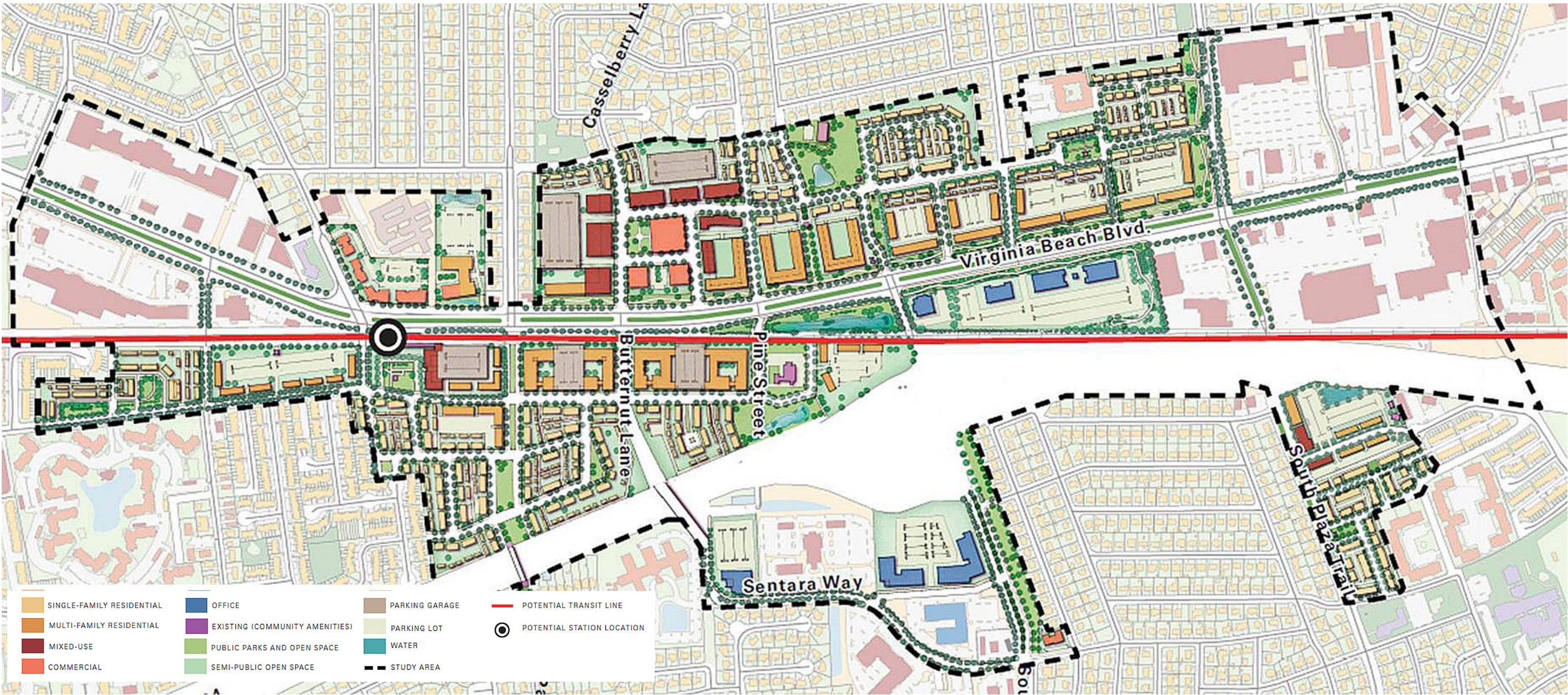
Figure 4.1-3 | Pembroke SGA Master Plan Map



Source: City of Virginia Beach, 2009



Figure 4.1-4 | Rosemont SGA Master Plan Map



Source: City of Virginia Beach, 2011



anticipated that some of the traffic currently using Fir Street and Budding Street would be diverted to Thalia Road. This would have the potential to cause an increase in vehicular traffic through the neighborhood and related noise.

ALTERNATIVE 2: NSRR Alternative

Alternative 2 would include all of the effects on land use from Newtown to the proposed Rosemont Station as noted in Alternative 1B.

Alternative 2 passes through five SGAs: Newtown, Pembroke, Rosemont, Lynnhaven, and Resort. Alternative 2 adds stations at Lynnhaven, North Oceana, the Virginia Beach Convention Center, and the Oceanfront Resort Area. A vehicle storage and maintenance facility (VSMF) would be located adjacent to the North Oceana station.

The proposed Lynnhaven Station and Park & Ride lot would be located between Lynnhaven Road and Lynnhaven Parkway currently zoned for light industrial use. Development potential east of the station is limited by AICUZ restrictions.

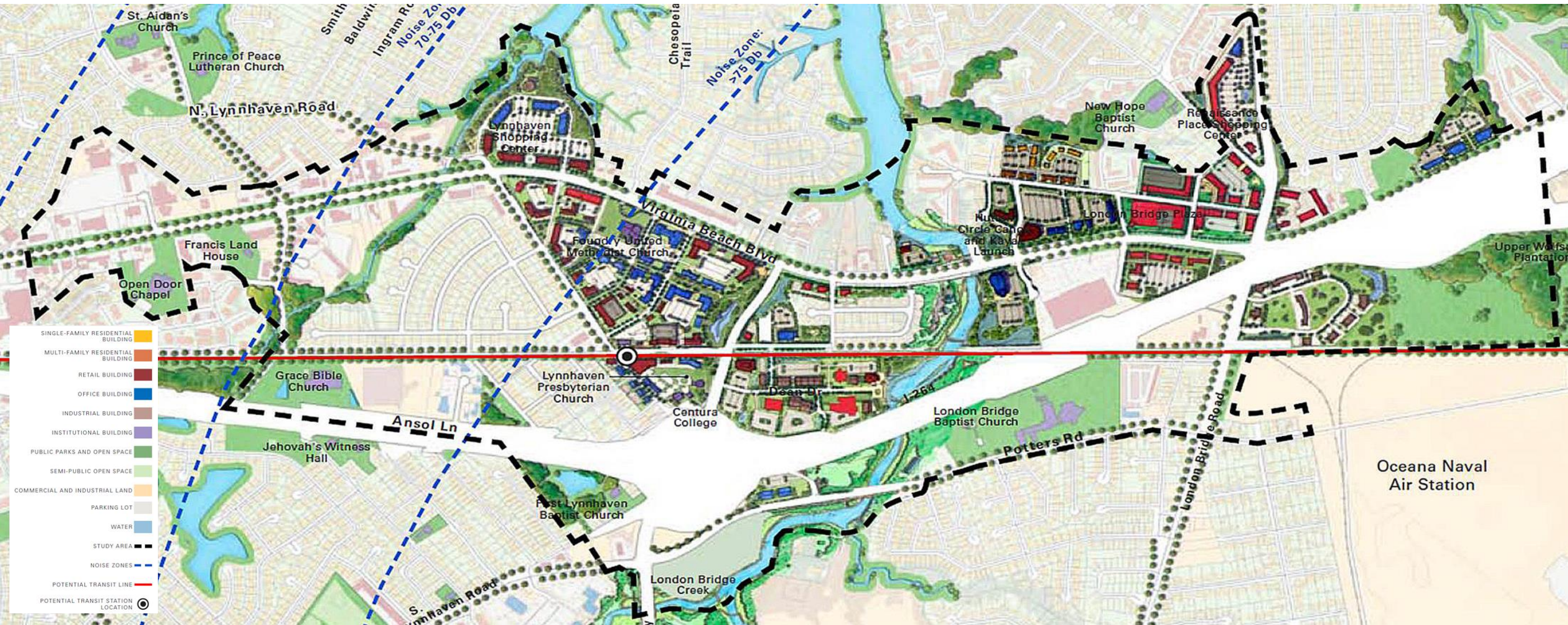
Figure 4.1-5 shows the master plan projection for the Lynnhaven SGA that includes an extension of an LRT system. Land uses in nearby residential communities, which include Lynnhaven Woods and Nottingham Estates to the south of Alternative 2, would not be impacted. Current zoning and AICUZ regulations limit the development potential in this area.

Continuing east, the proposed North Oceana station would be located north of NAS Oceana along Potters Road on City-owned property that is currently used for storm debris management and construction material disposal. The North Oceana station would include a Park & Ride facility. The site

has no commercial development potential due to restrictive easements owned by the Navy. The Oceana Gardens and West Oceana neighborhoods contain low-density, single-family housing and are not included as part of an SGA. Changes to land use patterns are not expected in these neighborhoods because of their proximity to NAS Oceana and the AICUZ regulations.

Considering the development restrictions imposed by existing AICUZ regulations, which would not support future residential development, opportunities for future residential growth along Alternative 2 from the proposed Rosemont Station to the proposed Convention Center are limited.

Figure 4.1-5 | Lynnhaven SGA Master Plan Map



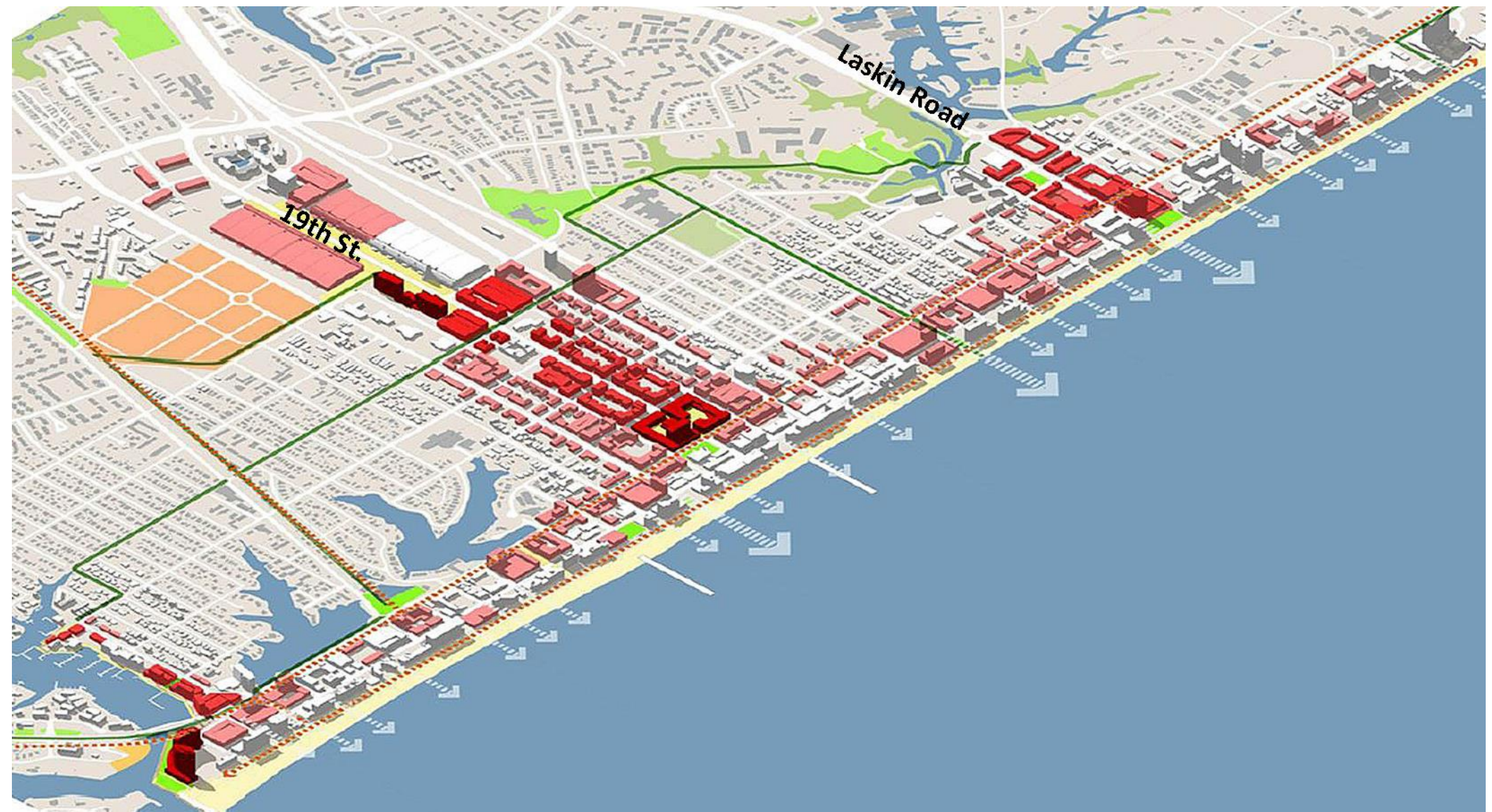
Source: City of Virginia Beach, 2012

Consequently, the demographic profile of this section of Alternative 2 is likely to remain unchanged. Any changes in the demographic composition of Alternative 2 would likely occur within the Pembroke SGA and Resort SGA, where SGA planning documents recommend higher density mixed-use development blending residential and commercial uses.

The proposed stations within the Resort SGA would serve current and proposed entertainment venues and recreational opportunities at the oceanfront. The proposed Convention Center station, located near the Virginia Beach Convention Center on Washington Street, has the potential to affect land use by supporting increased development in this area. In early 2014, the City began soliciting proposals for an 18,000 seat arena to be located near the Convention Center station, which would be the largest in the state. Currently, the area surrounding the Virginia Beach Convention Center is dominated by surface parking. The Convention Center station would be complemented with a Park & Ride option from this existing parking area.

The proposed walk-up only Oceanfront station, located on 19th Street between Baltic and Arctic Avenues, would provide access to a range of recreational and entertainment amenities. Additionally, the proposed Oceanfront station is located adjacent to the future site of the Dome entertainment complex. The Resort SGA Master Plan identifies the 19th Street area, one of the primary arterials leading to the Oceanfront, as a prime location for multi-family housing, transit-oriented development, retail, restaurants, and similar uses. Demographic changes could be expected within the Resort SGA should the recommended higher density development be achieved, which would increase the total population and population density for this section of Alternative 2. Similarly, land use impacts could be anticipated considering the City's vision of higher density development along the 19th Street gateway. **Figure 4.1-6** shows the master plan projections for the Resort SGA with the extension of an LRT system.

**Figure 4.1-6 | Resort SGA Master Plan Map**



Source: City of Virginia Beach, 2008

#### **ALTERNATIVE 3: Hilltop Alternative**

Alternative 2 would include all of the effects on land use from Newtown to the Lynnhaven Station as noted for Alternative 2.

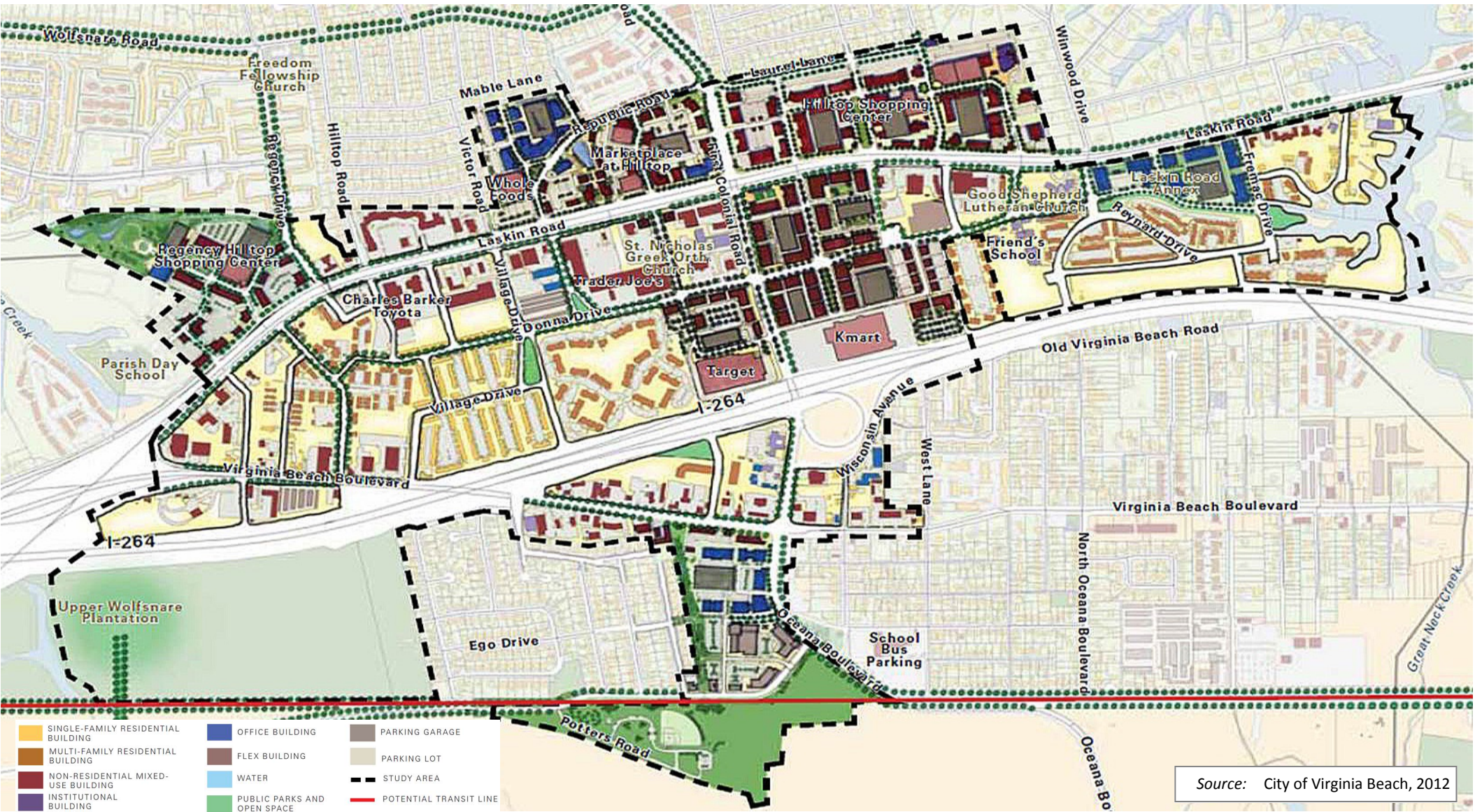
Alternative 3 passes through all of the SGAs located along the VBTES Corridor: Newtown, Pembroke, Rosemont, Lynnhaven, Hilltop, and Resort. Alternative 3 would add stations along the Laskin Road corridor at Great Neck, Hilltop West, Hilltop East, and Birdneck Road to the stations at the Convention Center and Oceanfront that were identified in Alternative 2.

The proposed Great Neck Station, located at the intersection of Great Neck Road and Virginia Beach Boulevard, would include an elevated platform above Virginia Beach Boulevard with an adjacent Park & Ride facility. Property acquisitions would be required for the Great Neck Station, which could facilitate additional land use changes as the immediate area transitions from lower-density, auto-oriented development toward a medium and high density commercial district. Existing AICUZ restrictions would limit building heights and prevent future residential development.

Two stations are proposed for the Hilltop Area to serve the core shopping areas at Hilltop. The shopping centers are anchored by large scale tenants, such as Trader Joe's and The Fresh Market, and include a range of smaller businesses and restaurants. A freestanding Whole Foods market is adjacent to the proposed Hilltop West Station at the intersection of Laskin Road and Republic Road. This station would be walk-up only while the proposed Hilltop East Station would include a Park & Ride facility. **Figure 4.1-7** shows the master plan projections for the Hilltop SGA with the extension of a transit system.



Figure 4.1-7 | Hilltop SGA Master Plan Map



The Hilltop SGA Master Plan does not recommend future expansion of the residential base, citing AICUZ restrictions and the area's proximity to NAS Oceana as factors. The existing residential neighborhoods within the Hilltop commercial area, Linlier to the north of Laskin Road and Chanticleer to the south, are stable communities not likely to be affected by transit operations. The demographic composition of Alternative 3 through the Hilltop SGA would not likely experience shifts in population or socioeconomic characteristics due to their build-out conditions.

The City's comprehensive plan and Hilltop SGA Master Plan recommend that the area should continue to function as an important commercial district for residents and visitors citywide and from across Hampton Roads. Specifically, the Hilltop SGA Master Plan recommends strengthening and diversifying the retail core, improving multimodal transportation options, increasing building density, and providing stronger pedestrian environments that encourage walkability and connectivity within the Hilltop SGA. Potential land use changes would likely influence building

density and business accessibility, but the area's composition would remain substantially unchanged.

The proposed Birdneck Station is readily accessible to the variety of multi-family and single-family residential developments to the east and west of Birdneck Road. AICUZ restrictions preclude any future residential development in this area, although commercial development could be anticipated around the proposed Birdneck station and Park & Ride facility. Similar to the residential communities within the Hilltop SGA, demographic changes in neighborhoods along this section of Alternative 3 would not be expected.

Alternative 3 would cause the highest probability for potential property acquisitions that would impact private property. A detailed analysis of potential property acquisitions and displacements is provided in **Section 4.3**.

**BRT Build Alternatives**

The proposed BRT alignments mirror those previously described for LRT and share identical land use conditions. Proposed stations for the BRT build alternatives would also serve the same locations as the proposed LRT alternatives and service commuters with Park & Ride facilities.

The BRT build alternatives would incorporate different technologies and vehicles than the proposed LRT alternatives. Though not consistent with the City's comprehensive and SGA master plans, the BRT build alternatives would provide the city with high capacity transit service connecting The Tide to the six SGAs along the I-264 corridor.

Any direct land use impacts would be limited to the proposed station sites. Impacts to land uses surrounding proposed station areas should be minimal considering these sites are already developed. Changes in land use associated with BRT technology would not likely experience the development intensity or density that could be anticipated with the LRT build alternatives.

**4.1.5 Construction Impacts**

During construction, minor impacts to properties directly adjacent to the build alternatives could be expected. Any temporary changes in land use patterns would be related to construction staging. The most significant construction-related impacts to land use would occur for Alternative 3. Alternative 3 would require construction activities occur along the heavily traveled Laskin Road corridor and Birdneck Road. Construction impacts to residential areas would affect the Thalia Village neighborhood, where Alternative 1B, Alternative 2, and Alternative 3 would pass through. In the Thalia Village neighborhood, potential impacts would largely be caused by noise related to construction activity. Other neighborhoods along the VBTES Corridor could anticipate some noise related construction impacts, though construction would be phased and no residential areas

would experience adverse impacts for the duration of the construction process. The Birdneck Acres neighborhood, which would only be impacted by Alternative 3, could experience temporary changes related to travel conditions as the alignment is constructed within the median of Birdneck Road. All construction-related impacts would be temporary and would not outweigh the long-term benefits of high capacity transit serving the VBTES Corridor.

4.1.6 Indirect Effects

Indirect effects to land use patterns along the VBTES Corridor associated with build alternatives include the economic and social impacts related to the operation of a fixed guideway transit system. The City of Virginia Beach anticipates increased development opportunities around the proposed transit stations in accordance with national and international development trends that indicate fixed guideway, high capacity transit is a premier driver of economic development. The City of Virginia Beach comprehensive plan and SGA master plans emphasize the importance of transit and associated stations as central elements of the future growth and development strategy outlined by City leaders.

Additionally, improved accessibility and mobility facilitated by high capacity transit supports elements of the adopted planning documents that underscore enhancing the quality of life in Virginia Beach through a multi-modal transportation system that provides connections between the SGAs. Connecting residents from across the region and tourists during the busy summer travel season to activity centers within the City of Virginia Beach is critical to achieving citywide planning and development goals. Related environmental stewardship efforts that stem from the operation of high capacity transit further underscore the positive benefits indirectly associated with the LRT and BRT build alternatives.

4.1.7 Avoidance, Minimization, and Mitigation

No impacts to land uses are anticipated, so no mitigation is required. Where minor, localized effects could occur, the City of Virginia Beach, through the comprehensive planning process and zoning ordinance, would work with the affected communities on mutually agreeable strategies to minimize the effects. These strategies could include zoning changes, overlay districts, or focused zoning enforcement activities.

4.2 Economic Development

This section describes the economic activity and socioeconomic conditions in the VBTES Corridor. Also addressed in this section are potential economic effects of the alternatives, construction related impacts, and mitigation measures.

4.2.1 Legal and Regulatory Context

The City’s comprehensive plan and SGA master plans describe economic development objectives for areas within the VBTES Corridor. Citywide agencies most directly involved with economic development are the Department of Economic Development and the Economic Development Authority. The Department of Economic Development provides staff, resources, and oversight to enhance business diversity and increase employment opportunities. The Economic Development Authority supports these functions through efforts focused on expanding the City’s economic base and facilitating business investments. Both organizations have cited efficient and reliable transportation as a critical component for achieving the City’s economic development goals.

4.2.2 Methodology

Employment and income data were obtained from the 2010 Decennial Census Summary File 1 and American Community Survey 2006 -2010 Five Year Estimates summary file using block group 150 level data, accessed from the American FactFinder website (<http://factfinder2.census.gov>). The study area was determined using a ½ mile buffer for each build alternative and boundaries of the six SGAs within the VBTES Corridor. Including the SGA block groups in the analysis provides

additional context of the VBTES Corridor as these SGAs have been designated by the City of Virginia Beach to absorb the majority of future economic growth and development. Census block groups partially included in this study area were analyzed in their entirety. In total, 18 block groups were analyzed for Alternative 1A, 29 block groups for Alternative 1B, 64 block groups for Alternative 2, and 69 block groups for Alternative 3.

4.2.3 Existing Conditions

Labor Force and Income

Table 4.2-1 presents labor force and income characteristics from 2010 for the City of Virginia Beach and the VBTES Corridor. In 2010, the City of Virginia Beach had 210,960 employed persons with an unemployment rate of 6%. The study areas around each of the build alternatives had a lower unemployment rate than the City of Virginia Beach at

5%. The study areas for all of the build alternatives have lower average household income and per capita income compared to the City of Virginia Beach.

Major Employers

As described in Chapter 1, the United States military represents a large component of the workforce in the City of Virginia Beach with large numbers of both civilian and uniformed personnel at two major military installations (Joint Expeditionary Base Little Creek-Fort Story and NAS Oceana, which includes the Dam Neck Annex). The City of Virginia Beach public school system and municipal government are the largest non-military public sector employers in the City. Private businesses representing a variety of industry sectors, including manufacturing, finance, information technology, and education are also large employers. Table 4.2-2 and Figure 4.2-1 show the major employers in the City and the VBTES Corridor.

Table 4.2-1 | Selected Labor Force and Income Characteristics of the Alternative Study Areas

Study Area Characteristics	ALTERNATIVES				City of Virginia Beach
	1A	1B	2	3	
	Town Center Alternative	Rosemont Alternative	NSRR Alternative	Hilltop Alternative	
LABOR FORCE					
Total Persons	21,900	38,254	81,823	89,381	437,994
% of Total Population	5%	9%	19%	20%	100%
Employed Persons <sup>1</sup>	11,710	19,215	42,195	45,935	210,960
Unemployed	600	988	2,318	2,427	11,761
% Unemployed	5%	5%	5%	5%	6%
Military Personnel	845	1,739	4,333	4,698	25,167
Not in Labor Force Total <sup>2</sup>	4,565	8,210	16,250	18,205	93,720
INCOME					
Average Household Income	\$56,252	\$57,361	\$55,245	\$57,501	\$69,210
Per Capita Income	\$27,263	\$27,202	\$28,596	\$30,541	\$31,446

<sup>1</sup>Employed Persons indicate the number of people employed within each alignment corridor and does not reflect the quantity of jobs available.

<sup>2</sup>By Census definition, active military personnel and persons under 16 years of age are not included in the available labor force.

Source: U.S. Bureau of the Census, Summary File 1, 2010; American Community Survey, 2006 – 2010 5 Year Estimates, 2014



Table 4.2-2 | Major Employers in the VBTES Corridor and the City of Virginia Beach

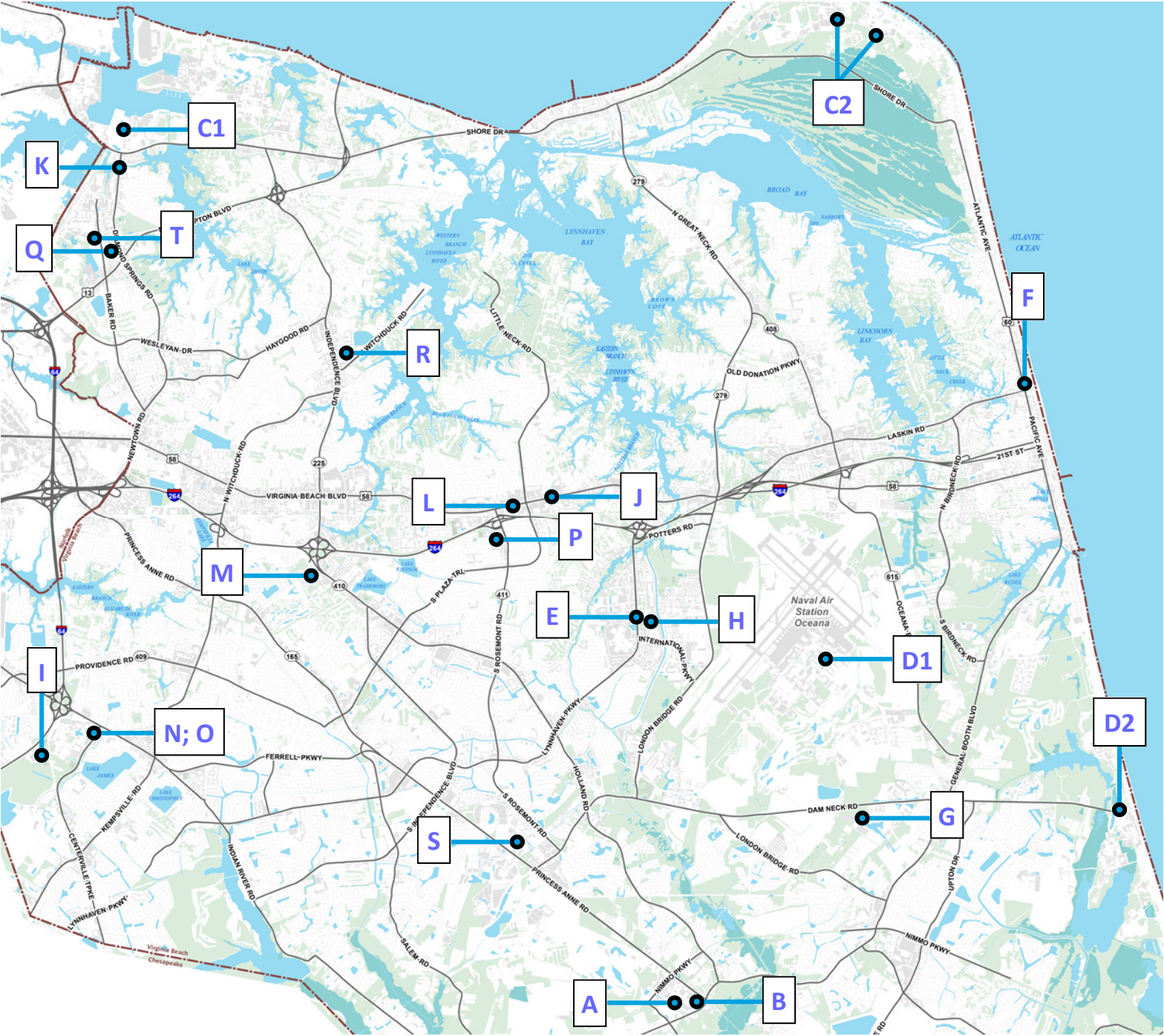
Map Key	Company	Type of Business	Civilian Employees	In VBTES Corridor
A	City of Virginia Beach Public Schools	Public Sector Education	15,299 <sup>+</sup>	
B	City of Virginia Beach	Municipal Government	6,000 <sup>+</sup>	
C1; C2	Joint Expeditionary Base Little Creek/Ft. Story	Military Base	6,000*	
D1; D2	Naval Air Station Oceana/Dam Neck	Military Base	3,600*	✓
E	Lynnhaven Mall	Retail Trade	2,600	
F	Gold Key/PHR Hotels and Resorts	Developer, Owner, and Operator of Hotels	2,365	✓
G	GEICO General Insurance Company	Auto & Other Vehicle Insurance Carriers	2,300	
H	STIHL Incorporated	North American Headquarters; Power Tools Manufacture	2,067	
I	AMERIGROUP (Wellpoint)	Corporation Insurance Carriers	1,850	
J	Navy Exchange Service Command	Headquarters; Military & Government Exchange Retail	1,550	✓
K	MANCON	Industrial Supplies and Supply Chain Management	1,400	
L	Hall Automotive Group	Car Dealership	1,042	✓
M	Engility Corporation	Engineering Services	800	
N	The Christian Broadcasting Network, Inc.	TV Broadcast and Cable Networks	721	
O	CBN	Radio and Television Broadcasting	700	
P	LoanCare Servicing Center, Inc.	Regional Headquarters; Financial Services	690	✓
Q	Harmony Investments, Inc.	Hospitality	656	
R	Sentara Bayside Hospital	General Medical and Surgical Hospitals	639	
S	LifeNet Health	Ambulatory Health Care Services	560	
T	Lockheed Martin Corporation	Information Technology Services	510	

<sup>+</sup>A portion of public sector and municipal government employees are a part of the workforce of the VBTES Corridor for those schools and City offices located within the study area. The exact figure of public sector and municipal government employees within the VBTES Corridor could not be obtained.

<sup>\*</sup>Military Personnel not included in civilian workforce total. At the time of publication, employment figures for military personnel were not made available.

Source: City of Virginia Beach Department of Economic Development, 2014

Figure 4.2-1 | Major Employers in the VBTES Corridor and the City of Virginia Beach



Source: HDR, 2014

#### 4.2.4 Environmental Effects

##### No Build Alternative

Under the No Build alternative, the VBTES project would not be undertaken. Without the implementation of a high capacity transit system, the economic development goals of the strategic growth area planning model (as described in **Section 4.1**) would not be met and employment growth throughout the VBTES Corridor would not be complemented by a multimodal transportation system.

##### Build Alternatives

##### LRT Build Alternatives

The SGA model aims to concentrate future economic growth in targeted areas. Extending transit from The Tide's Newtown Road Station east through the SGAs to the Oceanfront Resort Area is seen by the City as a key objective to reaching development/re-development goals. The LRT build alternatives would serve as a vital infrastructure improvement encouraging future economic growth and development in the identified SGAs.

The LRT build alternative would connect citywide employment, retail, and tourist destinations with surrounding residential neighborhoods. Increased travel routes through congested west-east transportation corridors are critical mobility improvements outlined in the City's comprehensive plan. See **Section 4.3** for details of the acquisitions and displacements required for each Alternative.

##### ALTERNATIVE 1A: Town Center Alternative

Alternative 1A would support economic development initiatives in two SGAs located along the VBTES Corridor: Newtown and Pembroke. The Newtown SGA is planned to become a hub of office and institutional uses, incorporating mixed-use development. A central transit station linking the Newtown SGA with other employment centers in Virginia Beach is acknowledged through the City's comprehensive plan as an important transportation and economic development goal. The Pembroke SGA, which encompasses the Town Center of Virginia Beach, is planned to experience substantial growth in the number of households and jobs. Establishing transit connectivity in the Town Center of Virginia Beach would further support economic

development and planning goals of the City. Furthermore, enhancing transit connectivity between downtown Norfolk and the Town Center of Virginia Beach would support the economic vitality of the region.

Private property would need to be acquired at various points along the alignment; however, these displacements would have a negligible effect on the City's tax and employment base.

##### ALTERNATIVE 1B: Rosemont Alternative

Alternative 1B would include all the impacts and benefits discussed in Alternative 1A. While Alternative 1B would support economic development goals within the Newtown and Pembroke SGAs, it would also support the Rosemont SGA. The *Rosemont SGA Master Plan* recommends redeveloping the transitional, low-density commercial area that dominates the landscape into a medium-density, mixed-use neighborhood. Fixed guideway transit is consistent with the economic development goals of the Rosemont SGA.

The billboards currently occupying the Rosemont Station site, which is vacant and void of structures, would either be relocated or otherwise compensated. No adverse effects to the VBTES Corridor or city-wide economic activity would occur.

##### ALTERNATIVE 2: NSRR Alternative

Alternative 2 would support the planned economic development/re-development goals of five strategic growth areas including the three identified for Alternative 1B. The Lynnhaven SGA Master Plan recommends the transition to higher intensity commercial and office uses. The Resort SGA Master Plan envisions future development supporting the hospitality industry while also providing increased housing opportunities for residents. The implementation of fixed guideway transit would provide tourists and residents within the Resort SGA a reliable transit connection to other destinations in Virginia Beach and Norfolk along The Tide LRT system. It would also provide Hampton Roads residents and visitors premium transit to the Virginia Beach resort area.

Between the Lynnhaven and Convention Center stations, Alternative 2 passes north of NAS Oceana. Development opportunities along this portion of Alternative 2 are strictly limited by NAS Oceana flight operations and AICUZ regulations.

Direct economic effects include those discussed for previous alternatives. Additional property acquisitions and displacements would occur at identified points along the alignment. However, the City would not experience significant negative impacts on the tax base resulting from the property impacts and no other direct adverse economic effects would occur along the alignment. Long range economic impacts in the VBTES Corridor would support the City's future economic development goals through improved transit connectivity between residential neighborhoods, employers, and commercial areas.

##### ALTERNATIVE 3: Hilltop Alternative

Alternative 3 includes all the benefits and impacts for the previous alternatives from Newtown Road Station to just past the Lynnhaven Station. Alternative 3, in addition to providing transit service from The Tide to the Oceanfront Resort Area, would serve the Great Neck Shopping Center, the Hilltop SGA, and the northern most segment of Birdneck Road where it meets Laskin Road. The Hilltop SGA includes national retailers together with small businesses including specialty retail and dining. The creation of a transit-oriented, walkable commercial neighborhood with multiple transit connections supports the planning vision contained in the City of Virginia Beach Comprehensive Plan and Hilltop SGA Master Plan. As envisioned in the Hilltop SGA Master Plan, the Hilltop commercial area would continue developing into a significant retail destination, generating increased tax revenue and exposure for the City of Virginia Beach.

Similar to previously discussed alternatives, direct economic impacts include property acquisitions and displacements that would occur to accommodate the alignment.

Among the four alternatives, Alternative 3 provides the greatest potential for future economic growth because of direct economic effects and the number of SGAs it intersects. Alternative 3 would establish fixed guideway transit through areas of the City with significant commercial developments, including the Town Center of Virginia Beach and the Hilltop shopping area, and provide transit accessibility for residential neighborhoods along the I-264 and Laskin Road corridors.

##### BRT Build Alternatives

The effects discussed above would be similar between LRT and BRT modes for each alternative with slight differences based on alignment and technology differences. The BRT build alternatives would provide access to the various SGAs along the VBTES Corridor and provide opportunities for development/redevelopment near the proposed station areas. The stations proposed for the LRT build alternatives remain the same for the BRT build alternatives. Where property impacts have been identified for the LRT build alternatives, the BRT build alternatives might not require the same acquisitions and displacements (see **Section 4.3**). Any property impacts associated with the BRT build alternatives would not have an adverse effect on the City's tax base.

Considering the applied planning documents maintain parallel goals regarding improved transit connectivity and future development/redevelopment concentrated in the City's SGAs, the economic effects in the VBTES Corridor for both technologies are likely to be similar. The implementation of high capacity transit, whether LRT or BRT, would also have the effect of providing neighborhoods with opportunities for interconnectivity without negatively impacting existing neighborhood structure.

#### 4.2.5 Construction Impacts

Temporary impacts to businesses are expected in the VBTES Corridor during the construction process for all of the build alternatives. The types of impacts expected largely revolve around changes to local traffic patterns in work zones and limited access to adjacent properties which could result in the possible temporary reduction in economic activity at affected businesses. Short-term lane shifts, detours, and road closures would be required to construct bridges for grade separated crossings as discussed in **Section 3.1.5**. These traffic impacts could have a negative impact on the businesses in the vicinity of the traffic changes. The level of impact on any particular business would vary by the duration of the traffic changes and the size and stability of the business. If a build alternative is implemented, a maintenance of traffic plan would be developed to address traffic operations during construction, including access to businesses and other properties in the affected areas.

During the construction of the build alternative, efforts to limit the economic impacts on businesses within the VBTES Corridor would be accounted for through measures that reduce potential negative effects on the economy. A construction management plan would be developed that outlines the scheduling and staging of construction, and it would describe measures that could be implemented to reduce the potential for economic losses incurred by businesses located on affected properties. The construction management plan would complement the provisions in the maintenance of traffic plan regarding access management, work area protection, and limitations on the times when construction activities may occur. It would address accessibility, parking needs, noise, and other construction-related activities that could impact businesses.

#### 4.2.6 Indirect Effects

Indirect effects for the build alternatives include temporary and future job growth related to construction activities and anticipated economic development in the VBTES Corridor. Employment opportunities, both short-term and in the future, provide the City with an expanding workforce contributing to the tax base.

Providing businesses in the VBTES Corridor with fixed guideway transit could serve as a competitive advantage by more effectively linking existing and future businesses with potential customers. Implementing fixed guideway transit would also enhance mobility options for the City's workforce. The City's economic development agencies have described transit as a pivotal element of an integrated economic system linking businesses with customers and employees.

#### 4.2.7 Avoidance, Mitigation, and Minimization

No long term adverse impact to economic development activity is anticipated so no mitigation would be required. Short-term mitigation efforts focusing on parking and business access would support the short-term economic functionality of commercial establishments along the VBTES Corridor. Temporary business access and parking would be coordinated with properties along the VBTES Corridor where construction related impacts are expected. These

mitigation efforts would be identified as part of the maintenance of traffic plan and the construction management plan, which would be developed during future phases of design.

### 4.3 Acquisitions and Displacements

This section describes the property acquisitions and displacements that have been identified during the conceptual engineering for each of the build alternatives. It describes the strategies that have been undertaken to eliminate or reduce the need for property acquisition, as well as mitigation strategies that would be undertaken to offset any impacts.

#### 4.3.1 Legal and Regulatory Context

All activities related to acquisitions and displacements would be conducted in conformance with the following laws, rules, and regulations.

##### Federal

The Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 (42 U.S.C. 4601) provides important protections and assistance for people affected by federally funded projects. This law was enacted by Congress to ensure that people whose real property is acquired, or who move as a result of projects receiving Federal funds, would be treated fairly and equitably and would receive assistance in moving from the property they occupy.

##### State

To provide assurance of assistance to displaced persons in accordance with the Federal Uniform Act, the Commonwealth of Virginia enacted the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1972 (the Virginia Uniform Act), set forth in the Code of Virginia 25.1-400 et seq.

An amendment to Article I, Section 11 of the Virginia Constitution, effective January 1, 2013, provides for payment of lost profits from a business suffered as a result of a taking of the property on which the business or farm operation is located, provided that 1) the business is owned

by the owner of the property taken, or by a tenant whose leasehold interest grants the tenant exclusive possession of substantially all the property taken, and 2) the owner or tenant proves with reasonable certainty the amount of the loss and that the loss is directly and proximately caused by the taking of the property through the exercise of eminent domain.

##### Local

The Transportation District Commission of Hampton Roads, doing business as Hampton Roads Transit, was granted the power of eminent domain under Title 15.2-4518(11) of the Code of Virginia. More specific powers and duties related to the right to acquire property are described in Title 25.1 of the Code of Virginia, including the duty to pay for certain moving and relocation expenses and other general rules for the conduct of acquisition of private property. To exercise the power of eminent domain, HRT must apply to the State Corporation Commission.

To supplement these laws and rules, HRT has adopted a Policy Statement on Property Acquisition. HRT has also developed a document entitled "The Real Estate Acquisition Process, A Guide for Property Owners and Tenants" to help explain the policy and process to individuals and businesses in the community.

The City of Virginia Beach, which may act as HRT's agent, has been granted the power to purchase property for public use under Title 15.2—Counties, Cities, and Towns, of the Code of Virginia. The City has various policies and procedures that govern this power.

#### 4.3.2 Methodology

To determine the property requirements for each of the build alternatives, the project's conceptual design was overlaid on City of Virginia Beach parcel mapping using geographic information systems (GIS) software. Property lines from the City's GIS base map were augmented in some areas along the VBTES Corridor (NSRR ROW, Birdneck Road, Laskin Road) with field surveys conducted either as part of this project or related projects.

In most locations the limit of the required property was defined by the limit of disturbance (LOD) (See **Appendix O** for definition and illustrations of the limit of disturbance). In highly developed areas, such as Laskin Road, Birdneck Road, and 19th Street, the back of the proposed sidewalk was used to define the proposed right-of-way.

The following types of real estate transactions are discussed in this section.

- ~ **Full Acquisition:** The purchase of all fee simple land ownership rights of the property. Full acquisitions were assumed when the project would affect the primary structure or use of the property or when a supporting use (parking) was sufficiently affected to significantly reduce or remove the value of the primary use.
- ~ **Partial Acquisition:** This is the purchase of a portion of an overall property. Depending on the final use of the acquired property, the partial acquisition could be acquired either by fee simple or by easement (see below). Partial acquisitions were assumed when the amount or type of property required did not significantly affect the primary use or structure on the parcel.
- ~ **Displacement:** A displacement results from the acquisition and permanent conversion of a property to a transportation use. Displacements are measured in terms of the number of businesses or residential units affected rather than acquisition of a tax parcel.
- ~ **Easement:** An easement is the right of another party (in this case HRT or the City of Virginia Beach) to use all or part of the property of a property owner for some specific purpose. Easements can be permanent or temporary (i.e., limited to a stated period of time). The term may be used to describe either the right itself or the document conferring the right. Examples are: permanent easement for utilities, permanent easement for perpetual maintenance of drainage structures, and temporary easements to allow reconstruction of slopes during construction. For this DEIS, no permanent or temporary easements have been identified at the current stage of conceptual engineering. As the project progresses, required easements (both temporary and permanent) would be identified.

4.3.3 Existing Conditions

As described in **Section 4.1** Land Use, the VBTES Corridor contains a mix of land uses ranging from suburban to urban to resort-related. That section gives a more detailed description of the types of land uses by alternative.

4.3.4 Environmental Impacts

No Build Alternative

Under the No Build alternative various parcels and portions of parcels have been acquired for the widening of Laskin Road as part of the VDOT-managed project. These parcels were purchased using local, state, and federal funds.

Build Alternatives

Construction and operation of any of the build alternatives would require the conversion of various portions of and whole parcels to a transportation use. In general, the land would be required for one of the following reasons:

- 1. New turn lanes and road realignments
- 2. Safety improvements
- 3. Park & Ride lots/stations
- 4. New bridges over roadways
- 5. Traction power substations (LRT alternative only)
- 6. Areas for new sidewalks
- 7. Access roads (LRT alternative only)
- 8. Stormwater management

Impacts to all parcels identified in this section are subject to change as the design process develops. Additional properties, not identified in this section, may also be required.

LRT Build Alternatives

**Table 4.3-1** summarizes the property acquisitions required for the LRT build alternatives. **Appendix N** provides a full list and map of the identified properties.

ALTERNATIVE 1A: Town Center Alternative

Alternative 1A would require the purchase of eight whole commercial properties between Newtown Road and the Town Center Station options. The conversion of these properties to transportation purposes would require the displacement of seven businesses. Two of the businesses (near the intersection of Freight Lane and Princess Anne Road) would be required for safety and road realignment improvements. There are four businesses located at the proposed Witchduck Park & Ride. One additional business would be required for the Town Center West Station option.

ALTERNATIVE 1B: Rosemont Alternative

Alternative 1B would require the purchase of fifteen whole commercial properties between Newtown Road and the Rosemont Station. In addition to those noted for Alternative 1A, the remaining parcels are located at the Rosemont Park

& Ride. These parcels currently contain billboards that would require additional negotiation and potential relocation. Portions of eight additional commercial properties would also be required for various purposes.

Along with the commercial properties, portions of two residential properties would be required—one for a traction power substation and another for a portion of the required access road. Neither of these would require relocation of the residents.

ALTERNATIVE 2: NSRR Alternative

Alternative 2 would require the purchase of 23 entire commercial properties requiring the displacement of 31 businesses. In addition to those noted for Alternative 1B, the majority of the businesses (21) are in one building adjacent to NSRR ROW east of the Rosemont Station. This

parcel would be required for the construction of the bridge over Rosemont Road. Business relocations would also be required for the Park & Ride at Lynnhaven and for track/ROW at the intersection of Virginia Beach Boulevard and Birdneck Road. A small portion of one additional residential property (beyond those noted for Alternative 1B) along Birdneck Road would be required for Alternative 2. Relocation of the residents would not be required.

ALTERNATIVE 3: Hilltop Alternative

Alternative 3 would require the purchase of 38 whole commercial parcels and portions of 58 more. These acquisitions would require the displacement of approximately 51 businesses. In addition to the multi-tenant building required for the construction of the bridge over Rosemont Road as noted in Alternative 2, numerous businesses would be required to be relocated from the proposed Great Neck Park & Ride and the raised guideway over Virginia Beach Boulevard and Great Neck Road. Two businesses (including one that appears to be vacant) would need to be purchased for the Birdneck Park & Ride. Additional business would need to be acquired at the intersection on Laskin Road and London Bridge to accommodate required turn lanes on Laskin Road.

For Alternative 3, two single family residences would need to be relocated. These parcels are needed to realign Bluebird Lane to make a four-leg intersection with 24<sup>th</sup> Street and Birdneck Road. Without this improvement, access to the neighborhoods west of Birdneck Road and south of Laskin Road would be significantly reduced under this alternative.

LRT VSMF

The LRT VSMF would be located on land that is currently owned by the City of Virginia Beach. Currently there is an air installation easement on the property limiting its use. Access to the property from Potters Road would require Navy-owned land either by easement or purchase.

Table 4.3-1 | Summary of Acquisitions and Displacements for LRT Build Alternatives

	ALTERNATIVES			
	1A	1B	2	3
	Town Center Alternative	Rosemont Alternative	NSRR Alternative	Hilltop Alternative
TOTAL ACQUISITIONS				
Residential	0	0	0	2
Commercial	7 or 8 Depending on Town Center Station Option Selected	15	23	38
Government	5	5	6	7
PARTIAL ACQUISITIONS				
Residential	1	2	3	18
Commercial	8	8	24	58
Government	3	3	20	25
REQUIRED DISPLACEMENTS				
Residential Displacement	0	0	0	2
Business Displacement	7	7	31	51
Government	0	0	0	0

Source: HDR, 2014

BRT Build Alternatives

Table 4.3-2 summarizes the property acquisitions required for the BRT build alternatives. Appendix N provides a full list and map of the identified properties.

ALTERNATIVE 1A: Town Center Alternative

The BRT version of Alternative 1A would have similar property requirements to the LRT version of the alternative. A total of six commercial properties would need to be purchased, requiring the displacement of seven businesses. No residential properties would be required.

ALTERNATIVE 1B: Rosemont Alternative

Alternative 1B would require the purchase of 13 whole commercial properties between Newtown Road and west of Rosemont Road. The conversion of the properties would require the displacement of seven businesses similar to the

LRT Build Alternative 1B. The BRT Build Alternative 1B would require two fewer total acquisitions than the LRT Build Alternative 1B due to different infrastructure requirements (traction power substation and access road requirements for LRT that are not required for BRT).

ALTERNATIVE 2: NSRR Alternative

Alternative 2 would require the purchase of 18 entire commercial properties requiring the displacement of 28 businesses. In addition to those noted for Alternative 1B, the majority of the businesses (21) are in one building adjacent to NSRR ROW east of the Rosemont Station. This parcel would be required for the construction of the bridge over Rosemont Road similar to the LRT Alternative. Business displacements would also be required for the Park & Ride at Lynnhaven and for track/ROW at the intersection of Virginia Beach Boulevard and Birdneck Road. Fewer total and partial

acquisitions are required east of Birdneck Road due to the system operating in existing streets as opposed to dedicated right-of-way.

ALTERNATIVE 3: Hilltop Alternative

Alternative 3 would require the purchase of 29 whole commercial parcels and portions of 33 more. These acquisitions would require the relocation of approximately 39 businesses. Because the BRT Alternative 3 would operate on-street in certain areas, the number of required parcels is less than the LRT alternatives. Areas of on-street operations include Laskin Road from Great Neck Road to Philip Avenue, Birdneck Road, and 19<sup>th</sup> Street.

BRT VSMF

The BRT VSMF is located at the same site as the LRT VSMF. It would have the same effects as noted for that facility.

4.3.7 Avoidance, Minimization, Mitigation, and Compensation

Land acquisition has been minimized through the use of property owned by the City of Virginia Beach. All of the alternatives use some or a portion of the former NSRR ROW, which is owned by the City. Station sites have been located, where possible, to include existing City-owned parcels. Parallel rights-of-way, including paved streets and unimproved roads, have also been incorporated into the design to minimize the impact to adjacent properties.

All acquisitions and displacements would occur consistent with the Uniform Act, which requires that all projects receiving federal financial assistance meet certain relocation standards for the fair and equitable treatment of all displaced persons. The objective of the Act is to ensure that persons displaced as a direct result of federally-assisted projects are treated fairly, consistently, and equitably so that such persons would not suffer disproportionate injuries as a result of projects designed for the benefit of the public as a whole.

A displaced person is defined in the Act as “any person who moves from the real property or moves his or her personal property from the real property.” This definition includes owner-occupants as well as tenants to real property. A dwelling is defined in the Act as “the place or permanent or customary and usual residence of persons, according to a local custom or law, including a single family house; a single family unit in a two-family, multi-family or multi-purpose property; a unit of a condominium or cooperative housing project; a non-housekeeping unit; a mobile home; or any other residential unit.”

The Act provides that all persons must receive advance written notice of the relocation at least 90 days prior to relocation and be provided with relocation assistance looking for comparable replacement dwellings. In addition, all displaced persons must be notified of their eligibility for relocation assistance. Comparable replacement dwellings are defined as:

Table 4.3-2 | Summary of Acquisitions and Displacements for BRT Build Alternatives

	ALTERNATIVES			
	1A	1B	2	3
	Town Center Alternative	Rosemont Alternative	NSRR Alternative	Hilltop Alternative
TOTAL ACQUISITIONS				
Residential	0	0	0	0
Commercial	5 or 6 Depending on Town Center Station Option Selected	13	18	29
Government	4	4	5	6
PARTIAL ACQUISITIONS				
Residential	0	0	0	4
Commercial	3	3	12	33
Government	3	3	7	13
REQUIRED DISPLACEMENTS				
Residential Displacement	0	0	0	0
Business Displacement	7	7	29	39
Government	0	0	0	0

Source: HDR, 2014

4.3.5 Construction Impacts

During construction, various parcels may be required for construction staging, property access, and other temporary purposes. HRT, the City of Virginia Beach, and the construction contractor would work with the affected property owners to determine the area required and negotiate reasonable compensation for the temporary use. HRT, the City of Virginia Beach, and the construction contractor would ensure that any property temporarily required during construction is restored to pre-construction conditions following construction activities.

4.3.6 Indirect Effects

Property impacts attributed to the build alternatives would directly affect identified properties through the previously discussed types of real estate transactions. Potential indirect effects of property acquisitions in the VBTES Corridor could include the transition of land uses near proposed transit stations and along the build alternatives where properties would be acquired. Other indirect effects could include improved walkability and accessibility around proposed transit stations as these areas are redesigned to promote transit use.

- ~ a decent, safe, and sanitary structure.
- ~ functionally equivalent to the displacement dwelling defined as a dwelling that performs the same function, provides the same utility, and is capable of contributing to a comparable style of living.
- ~ adequate in size to accommodate the occupants.
- ~ in an area not subject to unreasonable adverse environmental conditions.
- ~ in a location generally not less desirable than the location of the displaced person’s dwelling with respect to public utilities and commercial and public facilities, and reasonably accessible to the person’s place of employment.
- ~ on a site that is typical in size for residential development with normal site improvements, including customary landscaping.
- ~ currently available on the private market.
- ~ within the financial means of the displaced person.

Relocation assistance for moving expenses must be provided for all owner-occupants or tenants of a dwelling unit who qualify as displaced persons. Owners of real property would receive just compensation for the value of their property and tenants would be relocated to dwellings which would not exceed the current base monthly rent and utility payments. For persons who own mobile homes but not the property upon which the mobile home is located, relocation of the mobile home would be provided in accordance with the Act. In addition to residential properties, business or farm operations are also protected under the Act and would be eligible for relocation assistance as defined in the Uniform Relocation Assistance and Real Property Acquisition Policy Act of 1970, as amended.

4.4 Cultural Resources

This section identifies nearby historic, archaeological, and cultural resources within the VBTES Corridor that could be affected by the project and describes actions being taken to avoid or minimize any potential effects to those resources.

Cultural resources is an “umbrella term” for many heritage-related resources. These resources include prehistoric and historic sites, buildings, structures, districts, objects, or any other physical evidence of human activity considered important to a culture, a subculture, or a community for scientific, traditional, religious, or any other reason. Cultural resources are commonly subdivided into archaeological resources (prehistoric or historic sites where human activity has left physical evidence of that activity but no structures remain standing), architectural resources (buildings or other structures or groups of structures that are of historic, architectural, or other significance), and traditional cultural resources (for example, traditional gathering areas).

4.4.1 Legal and Regulatory Context

Several Federal laws and regulations govern protection of cultural resources, including the National Historic Preservation Act of 1966 (NHPA) (5 U.S.C. 300101 et seq.) and its implementing regulations (36 CFR Part 800). The NHPA defines historic properties as buildings, structures, sites, districts, or objects listed in or eligible for listing in the National Register of Historic Places (NRHP), the official listing of properties significant in U.S. history, architecture, or prehistory administered by the National Park Service. Historic properties are generally 50 years of age or older, are historically significant, and retain integrity that conveys this significance. Section 106 of the NHPA (Section 106) requires Federal agencies to take into account the effect of their undertakings on historic properties and to afford the Advisory Council on Historic Preservation (ACHP) a reasonable opportunity to comment on the undertaking.

Other relevant laws include NEPA (42 U.S.C. 4331), and Section 4(f) of the Department of Transportation Act (49 U.S.C. 303) and its regulations (23 CFR Part 774). Section 4(f) of the Department of Transportation Act allows for the use of an historic property only if there is no feasible or prudent alternative and all possible planning has been

undertaken to minimize harm to the property. Section 4(f) impacts are discussed in Chapter 7 of this DEIS.

FTA formally initiated Section 106 consultation with the Virginia State Historic Preservation Office (SHPO) in June 2013. A meeting was held on July 25, 2013 between representatives of the SHPO, FTA, HRT, and the City of Virginia Beach to discuss the Section 106 process and the project’s Area of Potential Effects (APE), which is the geographic area or areas within which an undertaking may directly or indirectly cause changes in the character or use of historic properties, if any such properties exist.

The SHPO concurred with the APE on August 26, 2013. A site visit was conducted in September 2013 with representatives of the SHPO, HRT, and the City to provide a better sense of the setting of the proposed corridor and the nature of the properties within the APE. On November 26, 2013, the SHPO concurred with HRT’s proposed survey methodology which included a preliminary reconnaissance-level architectural survey for the DEIS, and a full architectural survey, evaluation, and assessment of effect

for properties within the APE of the Locally Preferred Alternative. Section 106 consultation remains ongoing.

The current APE, Figure 4.4-1, includes all four alignment alternatives being evaluated as part of the DEIS. The APE was defined as all parcels within the limit of disturbance (LOD) of each alternative and all parcels with existing views of the former NSRR ROW and views of the Hilltop alternative (Alternative 3) from Great Neck Road, Virginia Beach Boulevard, Laskin Road, and Birdneck Road. At proposed station locations, the APE was expanded to include adjacent parcels with views of each station. The APE is approximately 11 miles long and contains approximately 1,300 properties built between 1756 and the present.

4.4.2 Methodology

The reconnaissance-level cultural resource survey conducted for this DEIS was performed in accordance with the Virginia Department of Historic Resources’ Guidelines for Conducting Cultural Resources Survey in Virginia (Virginia DHR 2011) and meets the Secretary of the Interior’s Standards and Guidelines for Archeology and Historic

Figure 4.4-1 | VBTES Draft Area of Potential Effect (indicated in blue)



Source: HDR, 2013

*Preservation* (NPS 1983). The purpose of the survey was to begin to identify historic properties in the VBTES APE and to develop a historical context for the VBTES Corridor. This cultural resources survey is only the first phase of historic resources identification efforts for the VBTES. Upon selection of a Locally Preferred Alternative (LPA), a full architectural survey will be conducted of historic resources in the APE. Because the opening date for the project is conservatively anticipated to be 2020 for this DEIS, all properties constructed in or prior to 1970 will be surveyed and evaluated for listing in the NRHP. Potential project affects will be assessed for their impacts on historic properties. **Table 4.4-1** indicates there are 516 resources in the APE that were built before 1971.

**Table 4.4-1 | Historic-Age (pre-1971) Resources in the APE**

Date of Construction	Number of Properties Built
1700s	1
1800s	3
1900-1918	6
1919-1942	109
1943-1944	0
1945-1955	118
1956-1965	200
1966-1970	79
<b>Total</b>	<b>516</b>

Source: HDR, 2014

4.4.3 Recommendations for Further Study and Evaluation of Cultural Resources

After the preferred alternative for the VBTES is selected, the project APE will be refined in consultation with the SHPO and other consulting parties, and a full cultural resources survey will be conducted that meets both VDHR requirements and those of the Section 106 regulations.

Recommendations for Archaeology Survey and Evaluation

Archaeological survey of the APE will be conducted in accordance with the Secretary of the Interior's Standards and Guidelines for Archaeology and Historic Preservation and DHR's Guidelines for Conducting Cultural Resource Surveys in Virginia (2011). The field survey will include a controlled surface inspection of the entire APE, followed by excavation of shovel test pits (STPs) in areas that are likely to have minimal disturbance from past development. Gray & Pape's previous survey of the corridor will also be referenced.

Each shovel test will be recorded on standardized forms that include provenience, stratigraphic data such as depth, texture, and Munsell color, and the presence or absence of artifacts in each stratum. The nature of any features encountered in the excavations will be described in detail and documented via drawings and photographs. Artifacts recovered from the STPs will be bagged and labeled by provenience for laboratory processing. If any STPs test positive for cultural materials, additional shovel tests will be excavated in a cruciform pattern at 10-meter intervals in alignment with the grid pattern until two consecutive negative STPs are encountered. STPs will not be excavated in areas of standing water or in locations otherwise inaccessible or inappropriate, such as on slopes steeper than 30 degrees, and areas of extensive and deep ground disturbance. Disturbed areas will be documented photographically as well as mapped.

Artifacts recovered during the field survey should be sent to an archaeology laboratory for processing and analysis. All materials should be processed, sorted, and cataloged according to the protocol established by the DHR's standards for the processing and curation of archaeological

collections. The focus of the laboratory analysis should be to determine the occupation span, likely function, and degree of artifact preservation at each recorded site. Typological analysis of diagnostic artifacts should be the principal mechanism for dating the sites. Historic artifacts will be classified by functional groups based on the methodology developed by South (1977). Artifact assemblages will be compared with those described in site reports and publications in order to aid in the identification of both cultural and chronological association. Likely site functions will be evaluated in terms of the density and types of artifacts present, the physiographic characteristics of the site, the site size, and the presence and nature of any identified archaeological features and/or structures.

In conjunction with the architectural survey, a report will be prepared detailing the methods used to complete the survey, the evaluation, their results, and the assessment of effect on historic properties.

Recommendations for Architectural Survey and Evaluation

After completion of the Draft EIS and the selection of the preferred alternative, the project APE will be finalized and a full reconnaissance-level architectural survey will be conducted of historic-age (pre-1971) resources in the APE. Photography will be completed, site maps will be developed, and collected data entered into DHR's Virginia Cultural Resources Information System (VCRIS). A report will be prepared following 36 CFR 800.11, detailing the survey results, NRHP eligibility, and the assessment of effect on behalf of FTA. Resources will be evaluated for NRHP eligibility both individually and as part of a potential historic district. If the project is found to have an adverse effect on historic properties, an agreement document will be drafted.

Particular care will be taken in the evaluation of several of the neighborhoods located within the APE. Many of these mid-century neighborhoods, such as Pinewood Gardens, Eureka Park, Oceana Village, and Oceana West appear to be lacking the physical integrity necessary to convey their historic significance. Some of these neighborhoods have inappropriate materials, additions on the façade,

fenestration alterations, or have been affected by insensitive modern infill or demolitions and vacant lots that affect their integrity. However, others, such as Point-O-View and Bluebird Acres, have retained their integrity and have a strong sense of cohesiveness and appear to possibly be eligible for listing in the NRHP as historic districts.

Historic Properties in the APE

Several previous cultural resource studies have been conducted in the Virginia Beach area and the VBTES Corridor. According to VDHR's site file archives, there are 12 previously recorded archaeological resources and 69 previously identified architectural resources located within or immediately adjacent to the APE. Of these, only three (See **Table 4.4-2**) of the architectural resources are listed or eligible for listing in the NRHP. The three historic properties are described as follows:

**Table 4.4-2 | Previously Identified Properties within the APE Listed or Eligible for Listing on the NRHP**

VDHR #	Name	NRHP Status
134-0034	Upper Wolfsnare	NRHP Listed
134-5027	Oceana Naval Air Station Historic District	Potentially Eligible
134-5145	Norfolk & Virginia Beach Railroad	Eligible

Source: HDR, 2014

**Upper Wolfsnare** (DHR #134-0034), a ca. 1759 brick dwelling with rich interior paneling, was listed in the NRHP in 1975. It originally stood on 7,000 acres and was slated for demolition by the state for right-of-way for the Norfolk-Virginia Beach Expressway. It is located immediately to the north of the former NSRR ROW. The adjacent parcel to the east is the proposed site for the VSMF for Alternatives 2 and 3. It is currently used for various purposes including material storage, and a cellular tower has been erected within sight of the house.

**The NAS Oceana Historic District** (DHR #134-5027) is located directly to the south of the NSRR ROW. The APE near the installation will be revised if necessary to only include areas where the VBTES Corridor would be visible.

Finally, the VBTES is studying the reuse of the former NSRR ROW, which is historically known as the **Norfolk and Virginia Beach Railroad** (DHR #134-5145). Constructed in 1882 by Colonel Marshall Parks and a group of other investors, the narrow-gauge rail line was designed to provide an easy way to shuttle residents of Norfolk to the Virginia Beach oceanfront. The east-west rail corridor is credited as one of the major contributing factors to the development of the resort community on the Virginia Beach shoreline. The line was later upgraded to a standard-gauge line; however, service was formally discontinued in 2004. In 2008, the Norfolk and Virginia Beach Railroad corridor was determined eligible for listing in the NRHP under Criterion A.

#### 4.4.4 Environmental Impacts

Section 106 of the NHPA requires the determination of project effects on properties that are listed or eligible for listing in the NRHP. The criteria for adverse effects are defined in the regulations and have been applied to historic properties in the project APE. An adverse effect is one that may alter, directly or indirectly, those characteristics of a historic property that make the property eligible for listing in the NRHP, including its location, design, setting, materials, workmanship, feeling, or association.

#### No Build Alternative

Under the No Build alternative, the VBTES project would not be undertaken. Listed and eligible historic properties

would not be adversely affected.

#### Build Alternatives

As stated in the methodology section above, the purpose of the reconnaissance-level survey conducted for this DEIS was to illustrate the historical context of the corridor and identify historic resources that have been previously studied in the area of potential effects. No detailed impact determination has been conducted for this DEIS. More detailed survey, evaluation, and assessment of effect will occur after selection of the preferred alternative. However, knowing the corridor and the extent of the project, some general comments can be made regarding the effect of the project on historic properties.

The build alternatives would improve access for residents and visitors for historic properties in the corridor, including Upper Wolfsnare and the historic districts, and as such, is considered a beneficial impact.

#### Archaeological Resources

There would be no effects on known archaeological resources as there are none that are listed or eligible for listing in the NRHP located in the project APE. The proposed alignment alternatives are located in areas that have either been previously surveyed and have no archaeological sites, or are in areas where previous disturbances would result in low probability for additional archaeological resources. In the case of an inadvertent discovery, all ground-disturbing work in the area would be suspended until the materials are identified and documented and appropriate treatment is developed in consultation with the SHPO and consulting parties.

#### Temporary Effects

The proposed alternatives would be expected to result in temporary, short-term effects on resources resulting from construction noise and vibration and the potential re-routing of traffic along the NRHP-eligible Norfolk and Virginia Beach Railroad and in some of the potentially eligible historic districts. Measures will be taken to minimize any short-term effects on historic properties.

Noise control measures will be implemented to reduce the noise near residential areas and the historic properties,

including using equipment with enclosed engines or high-performance mufflers, locating equipment and staging areas far from historic properties, limiting equipment idling, installing temporary noise barriers, avoiding impact pile driving when possible, and re-routing construction traffic away from residential streets when possible.

Measures recommended for controlling any construction-related vibration include a pre-construction survey of important and potentially fragile historic resources in the project area, construction vibration limits for all buildings in the corridor, vibration monitoring at buildings that require lower vibration limits, and alternate construction procedures to reduce vibration from activities such as vibratory compaction, demolition, and pile driving.

These temporary effects would not compromise the integrity of the historic properties in the project area and would, therefore, not be adverse. None of these temporary impacts rises to the level of an adverse effect under Section 106.

#### Permanent Effects

Groundborne vibration impacts to historic properties should be minimal, based on the distance from the proposed transit way and because freight rail trains, which are much heavier than light rail or bus rapid transit vehicles, historically traveled along the same corridor and were once the source of significantly higher levels of vibration. Vibration from the LRT or BRT alternatives is not likely to adversely affect the integrity of location, design, setting, workmanship, feeling, or association of historic properties in the APE.

#### Overhead Catenary System

Utility poles with overhead wires are present for the vast majority of the project corridor. The existing overhead wires in the APE will lessen any potential impacts created by the introduction of the overhead catenary system. The catenary system would not adversely affect the integrity of location, design, setting, workmanship, feeling, or association of the historic properties in the APE.

#### Land Acquisition

Any proposed land acquisitions would need to be assessed

for their effect on historic properties and further consultation with the SHPO and other consulting parties would be needed regarding potential mitigation through location modifications, structure design, and other measures. **Tables 4.4-3** and **4.4-4** show the potential total and partial acquisitions that would be required for the build alternatives with structures built pre-1971. By age, structures 50 years and older are potentially eligible for listing on the National Register of Historic Places. As shown in **Table 4.4-3**, LRT and BRT Alternatives 1A and 1B would require the fewest (four) parcels and LRT Alternative 3 would require the highest amount (18) of parcel acquisitions with structures built pre-1971. **Table 4.4-4** shows that BRT Alternatives 1A and 1B would require the partial acquisition of a parcel occupied by a Hampton Roads Sanitation District pressure reducing station of an unknown age and historic eligibility status. LRT Alternative 3 would require the partial acquisition of 27 parcels with structures built in 1970 or before.

#### 4.4.5 Avoidance, Minimization, and Mitigation

Mitigation strategies will be fully developed with the completion of the FEIS.

### 4.5 Parklands and Recreation Areas

This section provides an inventory of parklands, recreation areas, and other preserved open space within or immediately adjacent to the VBTES Corridor. This section considers publicly owned parks and recreation areas, as well as privately owned facilities used by the public (such as golf courses).

#### 4.5.1 Legal and Regulatory Context

The Virginia Beach Department of Parks and Recreation manages and maintains all City-owned parklands and recreation areas within the City of Virginia Beach. The Virginia State Department of Conservation and Recreation is responsible for the operation and maintenance of False Cape State Park and First Landing State Park, which are outside of the VBTES Corridor.

Table 4.4-3 | Full Property Acquisitions of Parcels with Structures Built pre-1971

Address	Year Built	Land Use	Structure Type	ALTERNATIVES							
				LRT				BRT			
				1A	1B	2	3	1A	1B	2	3
5720 Princess Anne Road	1940	Commercial	Small Office Building	✓	✓	✓	✓	✓	✓	✓	✓
5059 Cleveland Street	1960	Commercial	General Commercial	✓	✓	✓	✓	✓	✓	✓	✓
104 N. Witchduck Road	1950	Government	Local Government	✓	✓	✓	✓	✓	✓	✓	✓
5049 Cleveland Street	1969	Commercial	General Commercial	✓	✓	✓	✓	✓	✓	✓	✓
3707 Virginia Beach Boulevard	1966	Commercial	Office-Multi-Tenant			✓	✓			✓	✓
130 Parker Lane	1960	Commercial	Service Station/Garage				✓				
2369 Virginia Beach Boulevard	1968	Commercial	Car Dealerships				✓				✓
2375 Virginia Beach Boulevard	1969	Commercial	Car Dealerships				✓				✓
2341 Virginia Beach Boulevard	1940	Commercial	Small Office Building				✓				✓
2335 Virginia Beach Boulevard	1962	Commercial	Markets/Retail				✓				✓
2333 Virginia Beach Boulevard	1959	Commercial	General Commercial				✓				✓
2325 Virginia Beach Boulevard	1969	Commercial	Markets/Retail				✓				✓
2320 Virginia Beach Boulevard	1951	Commercial	Markets/Retail				✓				
2312 Virginia Beach Boulevard	1969	Commercial	Shopping Center				✓				
1701 Laskin Road	1954	Commercial	Shopping Center				✓				✓
1096 Virginia Beach Boulevard	1953	Commercial	Service Station/Garage			✓					
1104 Bluebird Drive	1960	Residential	Single Family Residence				✓				
1100 Bluebird Drive	1960	Residential	Single Family Residence				✓				
1900 Baltic Avenue	1950	Commercial	General Commercial			✓	✓				
Total				4	4	7	18	4	4	5	12

Source: HDR, 2014



Table 4.4-4 | Partial Property Acquisitions of Parcels with Structures Built pre-1971

Address	Sq. Feet Required for Project	% of Parcel	Year Built	Land Use	Structure Type	ALTERNATIVES							
						LRT				BRT			
						1A	1B	2	3	1A	1B	2	3
5465 Greenwich Road	1,260	1%	1966	Commercial	Industrial Building	✓	✓	✓	✓				
4920 Southern Boulevard	1,129	1%	1959	Commercial	Small Office Building	✓	✓	✓	✓				
101 Independence Boulevard (HRSD PRS)	1,832	12%	Not Available	Government	HRSD Pump Station (Unknown Age/Eligibility)	✓	✓	✓	✓	✓	✓	✓	✓
4364 Southern Boulevard	7,862	9%	1945	Residential	Residence		✓	✓	✓				
2628 Southern Boulevard	1,157	5%	1930	Commercial	Residential Use/Commercial Zoning			✓	✓			✓	✓
2632 Southern Boulevard	1,134	7%	1940	Commercial	Residential Use/Commercial Zoning			✓	✓			✓	✓
2324 Virginia Beach Boulevard	683	5%	1955	Commercial	Markets/Retail				✓				
2310 Virginia Beach Boulevard	1,293	10%	1945	Commercial	General Commercial				✓				
2220 Laskin Road	1,506	6%	1930	Commercial	Small Office Building				✓				
2212 Laskin Road	1,516	8%	1930	Commercial	Small Office Building				✓				
1965 Laskin Road	1,622	5%	1937	Commercial	Markets/Retail				✓				✓
1945 Laskin Road	958	2%	1954	Commercial	Small Office Building				✓				✓
1937 Laskin Road	594	7%	1946	Commercial	Small Office Building				✓				✓
1933 Laskin Road	489	3%	1946	Commercial	General Commercial				✓				✓
1721 Laskin Road	2,558	7%	1955	Commercial	Shopping Center				✓				✓
1484 Laskin Road	1,185	4%	1964	Government	Local Government				✓				✓
1413 Laskin Road	192,540	36%	1955	Government	Local Government Schools				✓				✓
1265 Laskin Road	1,060	1%	1960	Government	Religious Churches				✓				✓
1265 Laskin Road	2,199	4%	1960	Government	Religious Churches				✓				✓
101 Bay Ridge Court	2,206	2%	1970	Residential	Apartment Complex			✓					
420 Birdneck Circle	1,474	13%	1960	Government	Local Government				✓				
533 N. Birdneck Road	148	2%	1940	Residential	Residence				✓				
508 N. Birdneck Road	1,039	8%	Not Available	Commercial	Office Condominium				✓				
554 N. Birdneck Road	813	6%	1940	Residential	Residence				✓				
508 N. Birdneck Road	2,168	6%	1965	Commercial	Office-Multi-Tenant				✓				
564 N. Birdneck Road	346	2%	1970	Commercial	Markets/Retail				✓				
1003 Fleming Circle	412	1%	1969	Residential	Apartment Complex				✓				
1052 Cardinal Road	2,904	1%	1970	Commercial	General Commercial				✓				✓
Total						3	4	7	27	1	1	3	13

Source: HDR, 2014



### 4.5.2 Methodology

Information on existing parkland, recreational, and open space resources within or immediately adjacent to the VBTES Corridor was obtained from the City of Virginia Beach Geographic Information System (GIS) as well as the City's Comprehensive Plan Technical Report & Reference Handbook (December 8, 2009) and Department of Parks and Recreation documentation and correspondence ([www.vbgov.com/government/departments/parks-recreation](http://www.vbgov.com/government/departments/parks-recreation); email communication: June 21, 2013 and July 9, 2013). Additionally, the list of LWCF properties for Virginia Beach was reviewed from the National Park Service online database (<http://waso-lwcf.ncrc.nps.gov/public/index.cfm>). Resources considered include those owned by the City of Virginia Beach, Virginia Beach City Public Schools, and other public parks, recreation areas, state natural areas, and waterfowl and wildlife preserves. In addition, private recreational facilities open to the public were included where they could be directly or indirectly impacted by the project alternatives.

Direct impacts to parks and recreation resources, and preserved open spaces were considered to occur where the project would require the conversion of all or part of the property comprising these resources to transportation purposes or would impact a) traffic patterns in the immediate vicinity affecting access to the facility, b) noise or vibration within the park, c) the visual character or setting of the park, or d) safety or security of the park facility. The impact assessment area includes the limits of permanent disturbance for the alternatives (approximately equal to future ROW limits) for direct impacts, as well as a buffer of 100 feet beyond the limits of disturbance to take into account potential indirect impacts. Indirect impacts may include broader impacts to access. Additional information pertaining to visual, noise, and vibration impacts is provided in **Sections 4.6** and **5.8**.

### 4.5.3 Existing Conditions

There are eight parks within or adjacent to the VBTES alternatives. Parliament Park is a privately owned neighborhood greenspace adjacent to condominiums, while the Carolanne Farm Swim Club is a private pool

facility. Point O'View Elementary School has ball fields that are used outside of school hours by local recreational leagues. Central Park is a small urban greenspace near the Town Center of Virginia Beach development. Both Oceana Village Park and Eureka Park are small community playgrounds. The Cavalier Golf & Yacht Club is a private country club, and Tidewater Veterans Memorial Park is a small landscaped memorial.

Five of the parks are publicly owned. **Table 4.5-1** lists the existing parks, their type, and size that are potentially affected by the project's build alternatives. **Figure 4.5-1** shows their locations. Other large publicly-owned parks near but not adjacent to the alternatives include Mount Trashmore Park and Seatack Park, both south of the former NSRR ROW. In the neighborhoods around the VBTES Corridor, there are numerous small playgrounds, pools, and recreation fields owned by apartment complexes or homeowner associations. In addition, nearby public schools may provide recreational opportunities.

### 4.5.4 Environmental Impacts

#### No Build Alternative

Under the No Build Alternative, the VBTES project would not be undertaken. There may be impacts to the Cavalier Golf & Yacht Club as a result of the widening of Laskin Road. However, the roadway widening would occur regardless of the VBTES project.

#### LRT Build Alternatives

##### ALTERNATIVE 1A: Town Center Alternative

Alternative 1A would border four parks or recreation areas between the Newtown Road Station and the proposed Constitution Drive option of the Town Center Station. The corridor would be adjacent to Parliament Park, a private park serving a residential complex and the Carolanne Farm Swim Club, a private pool facility. Alternative 1A would also border the recreational fields located behind Point O'View Elementary School. The VBTES Corridor is also adjacent to the southern boundary of Central Park, a public pond and lawn area within the Town Center of Virginia Beach. No recreational property would be used for the operation and maintenance of this project.

Fencing would be installed as required to separate the transit system from the parks and playing fields. No noise, vibration, or visual impacts are anticipated (see **Sections 4.6** and **5.8**). No permanent direct impacts to any of these parks or recreation facilities would occur as a result of Alternative 1A.

##### ALTERNATIVE 1B: Rosemont Alternative

Alternative 1B would have the same impacts as Alternative 1A. No additional parks are adjacent to the alternative between the Town Center Station and the Rosemont Station.

##### ALTERNATIVE 2: NSRR Alternative

Between the Newtown Road Station and Rosemont Station, Alternative 2 would have the same effects as Alternative 1B. For Alternative 2, east of Lynnhaven Parkway, the tracks would pass south of Eureka Park (a neighborhood park and playground). The park is separated from the tracks by Southern Boulevard. Alternative 2 would form the southern boundary of Oceana Village Park, a neighborhood park and playground. Active rail transit service near Eureka Park and Oceana Village Park could present safety concerns for facility users that would require coordination with the parks' users, HRT, and the City of Virginia Beach. The alignment would run within the center lanes of 19<sup>th</sup> Street, and thus would not directly abut Tidewater Veterans Memorial Park. As such, there should be no safety concerns for park users. Overall, no permanent direct impacts to these parks are anticipated.

##### ALTERNATIVE 3: Hilltop Alternative

Alternative 3 would have the same direct effects as Alternative 1B between the Newtown Road Station and Rosemont Station, and the effects to Eureka Park and Tidewater Veterans Memorial Park would be the same as those described for Alternative 2. No permanent direct impacts are anticipated.

A small piece of land (approximately 2,900 square feet) along the southern edge of the Cavalier Golf & Yacht Club, a private country club, may need to be converted to transportation purposes to accommodate a new sidewalk adjacent to Laskin Road. The acquisition of the property could eliminate a treed buffer between the golf course and

the road and impact the use of a golf cart path at the edge of the property.

#### LRT VSMF

The LRT VSMF would be located on land owned by the City off of Potters Road, immediately north of the former NSRR ROW. The proposed facility would not impact parks or open space.

#### BRT Build Alternatives

All of the BRT Alternatives would be located along the previously described LRT alternatives' routes. The same impacts would occur along the BRT routes as described for the corresponding LRT alternatives. The BRT VSMF would be on the same land as the LRT VSMF and would not impact parks or open space.

### 4.5.5 Construction Impacts

During construction there is the potential for temporary impacts to the parklands described above. Depending on the construction phasing, access requirements, and safety considerations, portions of Central Park, Eureka Park, and the Tidewater Veterans Memorial Park may not be available for some portion of the construction process. In addition, there is the potential for short-term construction noise especially at parks adjacent to or near where bridges are being constructed (such as Eureka Park) due to pile driving activities. Coordination with each of the facility's owners would be undertaken to establish a plan to minimize any temporary effects from construction. Use of any portion of any parkland or recreation site for construction staging or access would be avoided to the extent feasible and, if appropriate, plans to restore the park or recreation land to its former (pre-construction) condition would be developed and implemented.

### 4.5.6 Indirect Effects

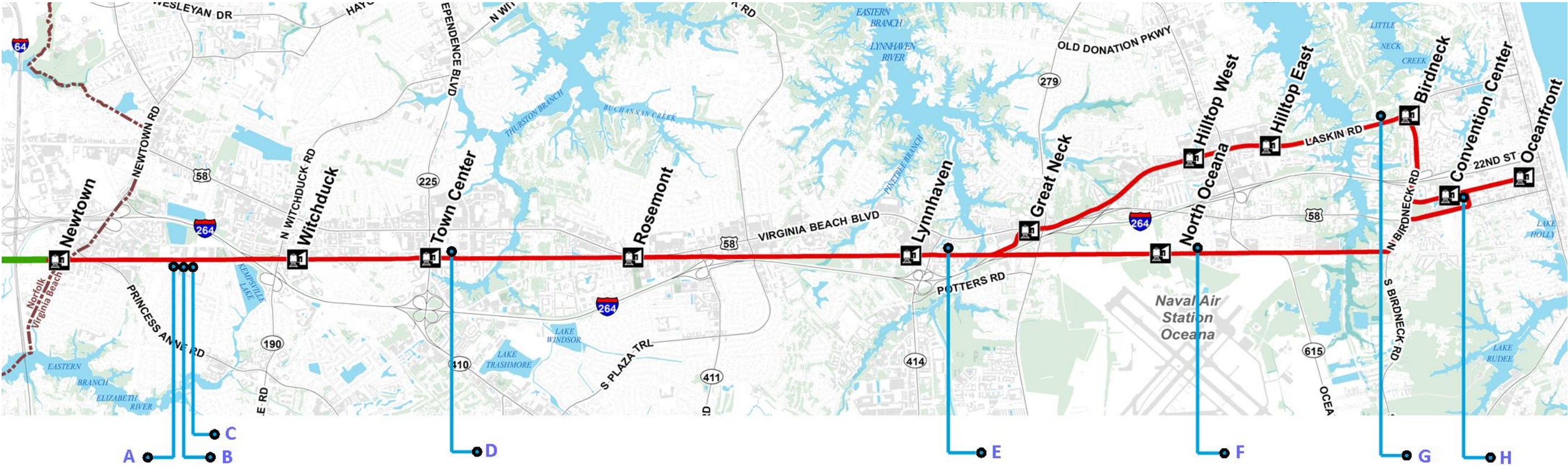
Access to parks and recreational facilities via major roads in the vicinity of the corridor would not be altered by any of the build alternatives. The location of the Town Center station is expected to provide an additional way for visitors to travel to Central Park, and the Convention Center station would provide another way to travel to the Tidewater

Table 4.5-1 | Parklands and Recreation Areas Directly Adjacent to the VBTES Alternatives

Map Key	Resource Name	Type of Facility	Location	Total Size (acres)	Ownership	Permanent Impact	Area of Impact
A	Parliament Park	Neighborhood park	Parliament Drive at Huntington Drive	10.9	Homeowners association	No	None
B	Carolanne Farm Swim Club	Private outdoor pools	5432 Parliament Drive	3.6	Non-profit recreation club	No	None
C	Point O’View Elementary School	Playing fields	Yoder Lane at NSRR	6.3 (fields only)	Virginia Beach Public Schools	No	None
D	Central Park	Pond and park with walking path	Market Street at NSRR	2.5	City of Virginia Beach	No	None
E	Eureka Park	Neighborhood park	Southern Boulevard at Eureka Avenue	1.4	City of Virginia Beach	No	None
F	Oceana Village Park	Neighborhood park	South Streamline Drive	1.7	City of Virginia Beach	No	None
G	Cavalier Golf & Yacht Club	Private golf course and yacht club	Laskin Road west of Birdneck Road	n/a	Private – Membership Only Club	Yes (minor property acquisition)	Approx. 2,900 sf
H	Tidewater Veterans Memorial Park	Memorial	19 <sup>th</sup> Street at Jefferson Avenue	0.9	City of Virginia Beach	No	None

Source: Fitzgerald & Halliday, 2014

Figure 4.5-1 | Locations of Parklands and Recreation Areas Directly Adjacent to the VBTES Alternatives



Source: HDR, 2014

Veterans Memorial Park under both the LRT and BRT alternatives. The City of Virginia Beach has an abundance of parks and recreational facilities, so any short-term or indirect effects to the overall recreational opportunities in the City would be minimal.

4.5.7 Avoidance, Minimization, and Mitigation

At the current stage of project design, a small piece of property at the Cavalier Golf & Yacht Club is expected to be required for Alternative 3. During final design, coordination with the owner of the Cavalier Golf & Yacht Club will be undertaken to discuss the impacts and determine appropriate mitigation. Should the area required for the project at the Cavalier Golf & Yacht Club be found critical for the continued operations of the club, design changes could be explored to further minimize the required amount of land. Additional options for mitigation include but are not limited to compensation, additional landscaping, replacement lands of equal value, or other considerations.

At other parks adjacent to the alternatives, coordination will be conducted with the facility owners and operators to discuss safety measures to protect park or recreation area users from accessing the LRT or BRT guideway. Fencing, landscaping, or other features may be installed to protect park users during transit operations.

4.6 Visual Quality

The visual setting of the VBTES Corridor is typical of most suburban environments. All of the build alternatives would be visible from residential, retail, industrial, office, and institutional land uses along the VBTES Corridor. The build alternatives are based, in part or entirely, on the reuse of the former NSRR ROW. Most of the adjoining uses face away from the now-abandoned tracks or have screening in the form of landscaping or privacy fencing to visually separate the ROW. An electrical power transmission line, with large towers, occupies a portion of the former NSRR ROW and creates a continuous, visually dominant feature in the VBTES Corridor. Other key visual features in the VBTES Corridor include the urban landscape at the Town Center of Virginia Beach, the transportation infrastructure of I-264, and the Virginia Beach Convention Center.

4.6.1 Methodology

To assess the potential impact to the visual environment, visually sensitive areas were identified along the VBTES Corridor. Visually sensitive areas are defined as those areas where viewers are likely to notice changes within the viewshed and/or have some expectation of a more natural or less developed landscape. Viewsheds are surface areas that can be seen from an observer’s viewpoint.

In general, areas of higher visual sensitivity within the VBTES Corridor include:

- ~ **Parks and Natural Areas** – Development within or near these areas is generally more prone to be noticed than development in more urbanized environments.
- ~ **Residential Areas** – Development in residential areas may result in effects if it were to obstruct or obscure views in or around the area.
- ~ **Historic Resources** – Changes in the visual context of historic resources may affect their eligibility for listing on the National Register of Historic Places.

Areas with a moderate visual sensitivity tend to be mixed residential and commercial areas where changes to the visual environment would be noticeable but not necessarily incompatible with existing views. Also commercial areas that have a strong consistent, visual identity (urban design, standard materials, etc.) could be considered as moderately sensitive. Areas identified as low sensitivity include industrial areas, commercial areas that lack visual continuity, and other areas that are completely screened from most users.

Viewers present within the VBTES Corridor include:

- ~ **Residents** – Residents living within visual range of the alignment would be sensitive to visual changes because of their fixed locations and viewpoints.
- ~ **Pedestrians** – These individuals would be sensitive to visual changes for the duration of their use because of their slow speed of travel and the proximity of the alignment to these areas.
- ~ **On-Roadway Travelers** – On-roadway travelers would be sensitive to visual changes but less than those

discussed above because they would be in motion and therefore would observe the views for limited time periods.

- ~ **Transit Users** – These individuals include daily riders going to work, shopping, or on other types of trips, and visitors who are seeing the area for the first time. Transit users would have a low degree of sensitivity to visual change because of the transient nature of their views.

4.6.2 Existing Conditions

The following describes viewsheds, types of viewers, and viewer sensitivity representative of the VBTES Corridor along the alignments of the build alternatives (see **Table 4.6-1**).

Table 4.6-1 | Summary of Existing Conditions Along the Build Alternative Alignments

Newtown Road Station to Town Center (page 4-24)	This segment encompasses the alignment of Alternatives 1A, 1B, 2, and 3 in the former NSRR ROW from the Newtown Road Station to the proposed Town Center Station. Most of the abutting parcels are industrial or commercial uses, with some single-family and multi-family residential.  Representative viewpoints are shown in <b>Figures 4.6-1</b> through <b>Figure 4.6-7</b> , on pages 4-24 through 4-26.
Town Center to Rosemont Road (page 4-26)	This segment encompasses the alignment of Alternatives 1B, 2, and 3 in the former NSRR ROW from the Town Center Station to the vicinity of the proposed Rosemont Station. Most of the abutting parcels are industrial or commercial users, with some single-family and multi-family residential.  A representative viewpoint is shown in <b>Figure 4.6-8</b> , on page 4-26.
Rosemont Road to Birdneck Road (page 4-27)	The Rosemont Road to Birdneck Road segment is part of the Alternative 2 alignment. A portion of the segment, from Rosemont Road to the site of the North Oceana Station and the VSMF, is shared with Alternative 3. Similar to the Newtown Road Station to Rosemont Road segment, this segment follows the former NSRR ROW. Land uses that abut the alignment are largely commercial and industrial, with some single-family and multi-family residential. Most viewers are residents and roadway users.  Representative viewsheds are shown in <b>Figures 4.6-9</b> through <b>Figure 4.6-13</b> , on pages 4-27 through 4-28.
Oceanfront Resort Area (page 4-28)	This segment encompasses the alignment of Alternative 2 from the former NSRR ROW at Birdneck Road to the Oceanfront Resort Area and Alternative 3 from Laskin Road at Birdneck Road to the Oceanfront Station. Viewers would primarily be from other roadway users and adjacent land uses.  Representative viewsheds are shown in <b>Figures 4.6-14</b> through <b>Figure 4.6-16</b> , on pages 4-28 and 4-29.
Hilltop Area (page 4-29)	This segment encompasses the alignment of Alternative 3 from the former NSRR ROW east of London Bridge Creek to Virginia Beach Boulevard and Laskin Road east to Birdneck Road. Viewers would primarily be from other roadway users and adjacent land uses. Roadways in the segment typically have multiple lanes that are bordered by commercial and retail strip development.  Representative viewsheds are shown in <b>Figures 4.6-17</b> through <b>Figure 4.6-20</b> , on pages 4-29 and 4-30. The build alternatives would change the visual environment through the construction and operation of either a LRT or BRT system.

Source: HDR, 2014

Newtown Road  
Station to Town  
Center

Figure 4.6-1 | View from Princess Anne Road looking northeast toward the alignment and former NSRR ROW.



**View 1 (Princess Anne Road at Freight Lane)**

Princess Anne Road is a busy four-lane roadway with a center median and sidewalks. Industrial and commercial developments flank the roadway. Primary viewers are on-roadway travelers. Given the heavy traffic, lack of landscaping, and number of industrial developments present, this viewshed is considered to have a low degree of visual sensitivity.

Source: HDR, 2014

Figure 4.6-2 | View from the Point O’View Elementary athletic fields looking north toward the alignment and former NSRR ROW.



**View 2 (Behind Point O’View Elementary School)**

Point O’View Elementary School is located between Parliament Drive and the former NSRR ROW. The elementary school’s athletic fields back up to the south side of the ROW and are a popular recreational area. Single-family residences, a church, and light industrial buildings abut the school property. The industrial building is located north of the former NSRR ROW and is partially visible from the athletic fields. Trees and shrubs located between the athletic fields and the ROW create a visual screen that partially obstructs the view of the industrial building and the ROW. Utility poles and wires run along the west side of the athletic fields and a power transmission line is visible along the former NSRR ROW. Primary viewers are residences and people using the athletic fields. Given the number of residences bordering the alignment and the active use of the recreational fields, this area is considered to have a moderate degree of visual sensitivity.

Source: HDR, 2014

Figure 4.6-3 | View from South Parliament Drive facing north toward the alignment and former NSRR ROW.



**View 3 (South Parliament Drive at the NSRR ROW)**

The view from South Parliament Drive is representative for the residences that flank the southern side of the former NSRR ROW in this area. A multi-story residential complex and a parking lot are located north of the ROW. Mature trees located behind the residences on the south side of the ROW provide a visual screen and restrict some views of the corridor. Primary viewers are residents. Because the views of the ROW are partially screened from most users, this viewshed has a moderate degree of visual sensitivity.

Source: HDR, 2014



Newtown Road  
Station to Town  
Center

Figure 4.6-4 | View from Witchduck Road looking east toward the alignment and former NSRR ROW.



**View 4 (Witchduck Road at the NSRR ROW)**

Witchduck Road is a busy four-lane roadway with utility poles and wires and intermittently present sidewalks. Commercial, industrial, and institutional developments flank the roadway. Primary viewers are on-roadway travelers. Given the heavy traffic, commercial and industrial development, utility poles and wires, and lack of landscaping, this area is considered to have a low degree of visual sensitivity.

Source: HDR, 2014

Figure 4.6-5 | View of Kellam Road looking south toward the alignment and former NSRR ROW.



**View 5 (Kellam Road at the NSRR ROW)**

Kellam Road is bordered by commercial, office, and residential developments. Single-family residences and multi-family residential complexes are present in the viewshed south of the ROW. There is some landscaping present along the former NSRR ROW and south of the ROW along Kellam Road that provides a visual buffer. Utility poles and wires and an electrical transmission line are visible along the ROW. Primary viewers are residents looking north and on-roadway travelers along Kellam Road. The viewshed in this area is considered to have a moderate degree of visual sensitivity south of the alignment because of the former NSRR ROW's proximity to the residences.

Source: HDR, 2014

Figure 4.6-6 | View of Independence Boulevard looking north toward the alignment and former NSRR ROW.



**View 6 (Independence Boulevard at the NSRR ROW)**

This location is within the Town Center of Virginia Beach. Independence Boulevard is a major arterial with an adjacent mix of commercial developments and restaurants. The Westin Hotel, the Sandler Center for Performing Arts, and a multi-family residential complex adjoin the roadway. Views in the area are dominated by the high rise building complex that comprises the Town Center of Virginia Beach. These buildings also block most views of the alignment from the north. Primary viewers are on-roadway travelers. The wide roadway, heavy levels of traffic, lack of consistent development, and the quantity of signage make this an area of low visual sensitivity.

Source: HDR, 2014



Newtown Road  
Station to Town  
Center

Figure 4.6-7 | View of Central Park looking southeast toward the alignment and former NSRR ROW.



View 7 (Central Park)

This location is within the Town Center of Virginia Beach. Central Park is a small park that consists of a pond with a paved trail and some landscaping. The park is located north of the former NSRR ROW and is surrounded by readily visible commercial developments, multi-family residential complexes, and utility facilities. Primary viewers are park users and pedestrians. The visible urban developments around the park and the park's limited size and use make this an area considered to have a moderate degree of visual sensitivity.

Source: HDR, 2014

Town Center to  
Rosemont Road

Figure 4.6-8 | View from Thalia Road looking north toward the alignment and former NSRR ROW.



View 8 (Thalia Road at the NSRR ROW)

Thalia Road is a narrow residential street that is flanked by single-family residences. The roadway is lined with mature trees and has no sidewalks. Primary viewers are residents. Given the residential nature and existing vegetation, Thalia Road is considered to have a high degree of visual sensitivity.

Source: HDR, 2014

Figure 4.6-9 | View of Rosemont Road looking northeast toward the alignment and former NSRR ROW.



View 9 (Rosemont Road at the NSRR ROW)

Rosemont Road within this viewshed is bordered by restaurants, gas stations, and commercial developments. The I-264 overpass over Rosemont Road is visible south of the former NSRR ROW. Primary viewers are on-roadway travelers. The levels of traffic, width of roadway, adjoining retail and commercial land uses, and the quantity of signage and utilities make this viewshed an area of low visual sensitivity.

Source: HDR, 2014



Rosemont Road  
to Birdneck Road

Figure 4.6-10 | View from Warren Place looking south toward the alignment and former NSRR ROW.



**View 10 (Warren Place, north of the NSRR ROW)**

Warren Place is a narrow residential street located within a multi-family residential complex. Warren Place is north of the former NSRR ROW and runs next to the ROW for a brief distance. Across from Warren Place and south of the ROW is an undeveloped parcel with woodland vegetation. The power transmission line is also visible along the south side of the alignment. Primary viewers are residents, looking south towards the alignment. Given the residential nature and woodland vegetation visible south of the alignment, Warren Place is considered to have a high degree of visual sensitivity.

Source: HDR, 2014

Figure 4.6-11 | View of Lynnhaven Parkway looking north toward the alignment and former NSRR ROW.



**View 11 (Lynnhaven Parkway at the NSRR ROW)**

Lynnhaven Parkway at this location is a busy four to six lane roadway. The roadway is bordered by urban strip development, including gas stations, office uses, and a car dealership. Primary viewers are on-roadway travelers. The wide roadway, heavy traffic, urban strip development, and the quantity of signage and overhead wires make this an area of low visual sensitivity.

Source: HDR, 2014

Figure 4.6-12 | View from Eureka Park looking south toward the alignment and former NSRR ROW.



**View 12 (Eureka Park, Southern Boulevard)**

Eureka Park is a neighborhood park located at the intersection of Southern Boulevard and Eureka Avenue. The park is landscaped with mature trees and a small playground. The former NSRR ROW and proposed alignment are visible across Southern Boulevard, a two-lane service road parallel to the ROW. Several industrial land uses abut the alignment on the south and are also readily visible from Eureka Park. Small office buildings and single-family residences surround the park north of the alignment. Primary viewers are park users and on-roadway travelers. Eureka Park is considered to have a low visual sensitivity because of the existing view of industrial land use and limited size of the park.

Source: HDR, 2014



Rosemont Road  
to Birdneck Road

Figure 4.6-13 | View of London Bridge Road looking north toward the alignment and former NSRR ROW.



**View 13 (London Bridge Road at the NSRR ROW)**

London Bridge Road is an arterial roadway with a center median and sidewalks. The roadway is flanked by a nursery, an open field, and single-family residences. Mature trees also intermittently flank London Bridge Road south of the alignment. The I-264 overpass is visible to the north. Primary viewers are on-roadway travelers. Given the wide roadway, inconsistent land development pattern, and proximity to the I-264 overpass, this area is considered to have a low degree of visual sensitivity.

Source: HDR, 2014

Oceanfront  
Resort Area

Figure 4.6-14 | View of 17<sup>th</sup> Street/Virginia Beach Boulevard looking east toward the alignment.



**View 14 (17<sup>th</sup> Street/Virginia Beach Boulevard, east of Birdneck Road)**

17<sup>th</sup> Street/Virginia Beach Boulevard within this viewshed is a busy four lane roadway primarily bordered by parking lots, gas stations, a police station, and commercial developments. Sidewalks and utility poles and wires are present. The Virginia Beach Convention Center is visible across the parking lots. Primary viewers are on-roadway travelers. Due to the wide roadway, utilities poles and wires, this area is considered to have a low degree of visual sensitivity.

Source: HDR, 2014

Figure 4.6-15 | View from Tidewater Veterans Memorial Park looking north towards the alignment.



**View 15 (Tidewater Veterans Memorial Park, 19<sup>th</sup> Street)**

Tidewater Veterans Memorial Park is a small memorial park located south of 19<sup>th</sup> Street and across the street from the Virginia Beach Convention Center. The park is surrounded by the Virginia Beach Convention Center's parking lots and is visually dominated by the Virginia Beach Convention Center building to the north. Visible landscaping consists of a small grass lawn with small trees and shrubs. The memorial, which is within the viewshed, is a small monument surrounded by flag poles. Primary viewers are park users and pedestrians. Due to the limited size of the park and its context within a parking lot, this area is considered to have a low degree of visual sensitivity.

Source: HDR, 2014



Oceanfront  
Resort Area

Figure 4.6-16 | View of 19th Street looking west toward the alignment.



**View 16 (19th Street at Pavilion Drive)**

19th Street at this location is a four lane roadway that is bordered by single-family residences, multi-family residential complexes, restaurants, office uses, commercial developments. Primary viewers are on-roadway travelers and residents. Given the existing land use, this area is considered to have a low degree of visual sensitivity.

Source: HDR, 2014

Hilltop Area

Figure 4.6-17 | View of Virginia Beach Boulevard looking east toward the alignment.



**View 17 (Virginia Beach Boulevard at Great Neck Road/London Bridge Road)**

Virginia Beach Boulevard at this location is a heavily traveled arterial is eight lanes wide. The roadway is lined with commercial developments, restaurants, and office buildings. Sidewalks and utility poles and wires are also present in the viewshed. Primary viewers are on-roadway travelers. Due to the existing mix of land uses, heavy traffic, and the roadway's existing visual clutter, this area is considered to have a low degree of visual sensitivity.

Source: HDR, 2014

Figure 4.6-18 | View of Laskin Road looking northeast toward the alignment.



**View 18 (Laskin Road at Republic Road)**

Laskin Road within this viewshed is a busy four-lane roadway with sidewalks intermittently present. A parallel service road is visible that provides access to the commercial developments along Laskin Road. The roadway is lined with residences, institutions, office buildings, and commercial developments. Utility poles and wires and commercial signage also line the roadway. Primary viewers are on-roadway travelers. Due to the heavy levels of traffic and existing visual clutter, this area is considered to have a low degree of visual sensitivity.

Source: HDR, 2014



Hilltop Area

Figure 4.6-19 | View from Winwood Drive looking northeast toward the Laskin Road Annex athletic fields. This is the proposed location for the Hilltop East Park & Ride.



View 19 (Laskin Road at Winwood Drive)

Winwood Drive within this viewshed is a narrow roadway lined with mature trees. The Good Shepherd Lutheran Church and the Laskin Road Annex, the location of Virginia Beach Public School’s Parent Support and Information Center, are visible. Single-family residences line the roadway north of Laskin Road. Primary viewers are on-roadway travelers and residents. Given the landscaping and primarily residential nature, this area is considered to have a moderate degree of visual sensitivity.

Source: HDR, 2014

Figure 4.6-20 | View of Birdneck Road looking north toward the alignment.



View 20 (Birdneck Road at Waterfront Drive)

Birdneck Road within this viewshed is a four-lane roadway with a center median, sidewalks, and utility poles and wires. Office buildings, gas stations, commercial developments, residences, and a large storage facility are visible. Primary viewers are residents and on-roadway travelers. Given the density of commercial and residential development along the roadway, this area is considered to have a low degree of visual sensitivity.

Source: HDR, 2014



### 4.6.3 Changes to the Visual Environment

The build alternatives would change the visual environment through the construction and operation of either a LRT or BRT system. The visual elements and characteristics of the LRT and BRT systems are described below. Greater detail can be found in **Chapter 2**.

#### Transit Vehicles

Transit vehicles would appear in the viewsheds on a periodic basis depending on the service plan. Vehicles would be moving through the landscape except when stopped at a transit station. Except for end of line stations, station stops are typically less than one minute in length.

- ~ **Light Rail Transit**—The light rail vehicles (LRV) for the build alternatives would be the same type of vehicle that is used for The Tide. The vehicles would be approximately 9 feet wide, 13 feet high, and 94 feet long., with a capacity of 160 to 180 passengers. The LRVs would operate as single units, but they would have the capability to be coupled and function as a multiple-unit train. The trains are electrically powered from an overhead wire. (See **Figure 2.1-16**).
- ~ **Bus Rapid Transit**—The BRT alternatives would operate using diesel powered, high-capacity, 60-foot articulated buses with a maximum capacity of 100 passengers. (See **Figure 2.1-22**).

#### Transit Guideway

The transit guideway would be the most visible portion of the build alternatives. The guideway would form a new linear feature in the landscape, primarily at or close to ground-level with occasional bridges over some major roadways. This transit feature is consistent with the nature of the existing resources in the area, including power lines and the existing rail infrastructure. Although the former NSRR ROW is mowed and clear of most trees and shrubs, construction and operation along the transit guideway would require the clearing of most or all of the remaining vegetation within the 66 feet ROW width. The descriptions below describe the specific visual elements of the modal alternatives. Chapter 2 describes the alternatives in additional detail.

~ **Light Rail Transit**—On the former NSRR ROW and Laskin Road, the LRT guideway would include two tracks made of steel rails, concrete ties, and stone ballast. On Birdneck Road and 19th Street, the tracks would be embedded in a concrete slab within the roadway. Where embedded tracks are used, they would be delineated using pavement markings, curbs, or other physical devices. See **Figures 2.1-14** and **2.1-15** for examples of both types of track structures.

Segments of tracks that cross over major roadways would be constructed on some combination of embankments, structural fill, or structure. Embankments and structural fill would be used for the approaches to the elevated structures over the roadways. The embankment would consist of a berm with slopes; the structural fill would be built up with retaining walls. Where structural fill is not practical, the tracks would be built on elevated bridge structures. The bridge structures would require support piers, pier caps, and a structural guideway with beams, rail bed, and railings. The elevated segments of the LRT tracks would be some of the most visible components of the proposed LRT system because they would be approximately 25 feet above the surrounding landscape.

An overhead contact system (OCS) to power the light rail vehicles would be required. The OCS would be a dominant vertical feature along the transit guideway. The OCS would consist of galvanized steel poles with cantilevered bracket arms that support wires above the light rail tracks. Along straight segments of track, support poles would be located approximately every 80 to 100 feet. For curved track segments, more poles would be required.

~ **Bus Rapid Transit**—To most viewers, the BRT guideway would appear to be a two-lane concrete street. The guideway would have a median barrier and could be fenced on either or both sides as determined during final design. Bridges over major roadways would have an appearance similar to highway overpasses. Since the BRT vehicles would be diesel powered, no OCS is required. See **Figure 2.1-21** for a rendering of a BRT guideway.

#### Transit Stations

The visual components of the transit stations would be the same for both BRT and LRT. The stations would include platforms approximately 90 feet in length, with canopy structure extending approximately one-third of the station platform lengths. In addition, the stations would include safety railings, ticket vending and validating machines, map and information cases, lighting, sidewalks, and urban design elements and furniture such as wind screens, benches, bicycle racks, and trash receptacles. The station canopies may be detailed to blend in with the corridor's character. Some of the stations would also include bus bays, drop-off/pick-up areas (Kiss & Ride), Park & Ride lots, and stormwater management systems, possibly including storage ponds. Stations and Park & Ride facilities would have landscaping that adheres to the City's design standards and guidelines. The sizes of the total station areas vary depending on the program requirements and the space available for each station.

#### Miscellaneous Structures

Various small buildings and other structures would be required for the build alternatives. They may include traction power substations (TPSS) for the LRT alternatives, signal housings, operator rest rooms, and traffic control devices. The two larger, more common structures are TPSS and signal control buildings.

Traction power substations are small buildings located approximately one per mile along the alignment. Typically the TPSS are metal buildings with size and appearance similar to a shipping container. However, depending on the visual sensitivity of an area, the TPSS can be clad with various architectural treatments to modify their appearance. See **Figure 4.6-21** and **4.6-22** for a typical and architecturally enhanced substation example.

Signal control boxes are small (100 square feet or less) metal buildings that are placed as the design requires. If necessary they can be architecturally enhanced to conform to their visual context. See **Figure 4.6-23** for a typical signal control building.

Figure 4.6-21 | Typical Substation



Source: HDR, 2013

Figure 4.6-22 | Architecturally Enhanced Substation



Source: HDR, 2013

Figure 4.6-23 | Typical Signal Control Building



Source: HDR, 2013



### Vehicle Storage and Maintenance Facility (VSMF)

The VSMF necessary for Alternatives 2 and 3 would be located along Potters Road north of NAS Oceana. Visually, the facility would include a 2 ½ story, 100,000 square foot maintenance building and an outdoor storage area for LRT/BRT vehicles. The building could be clad in brick or other architectural elements to allow it to blend with its visual environment, if required. The storage area and the exterior of the building would be lit at night for safety and security. However, safety considerations for aircraft landing nearby at NAS Oceana limit options for the type and design of the night-time lighting.

### 4.6.4 Construction Impacts

Project-related construction activities would have only a temporary impact on the visual environment. The activities and impacts would vary based on the type of construction required. The construction impacts, in general, would include the movement of construction machinery, construction of temporary roads and access ways, scaffolding and construction equipment, and temporary construction fences and screens. The most visible construction impacts would be at sites where bridges or overpasses are required for grade separation of the transit extension.

### 4.6.5 Visual Impacts

Visual impacts occur when physical changes in the viewshed negatively affect the viewer response to the change. Visual impacts are considered during both project construction and operation.

### No Build Alternative

Under the No Build alternative, the transit extension would not be constructed, the former NSRR ROW would not be cleared of its existing vegetation, and new bridges would not be built over major roadways. The corridor would continue as a key utility corridor including distribution and transmission lines for Dominion Virginia Power. The VBTES Corridor's existing visual quality would generally remain as it is today, subject to current development trends and increased traffic congestion. Laskin Road would undergo substantial widening and other improvements; however,

these would be at-grade with limited line-of-sight visibility outside the Laskin Road corridor. At-grade roadway expansions within the VBTES Corridor would not alter the existing visual integrity of the viewsheds along Laskin Road.

### Build Alternatives

Because of the built-up nature of much of the VBTES Corridor, the overall visual effects of the build alternatives would be relatively minor. Within specific viewsheds, the effects from the build alternative could be greater depending on the sensitivity of the viewers and the landscape.

#### ALTERNATIVE 1A: Town Center Alternative

Alternative 1A would begin at The Tide's Newtown Road Station and would travel east along the former NSRR ROW until it reached the proposed Town Center Station. The fixed guideway would be at-grade with the exception of overpasses at Witchduck Road and Independence Boulevard (depending on the station option chosen). The transit system would be visible only to viewers from abutting parcels and roadway users at crossings. Current views are of tracks and power transmission lines. Future views would add either LRT tracks and OCS or BRT guideway—both of which are similar to existing visual conditions.

The transit overpasses at Witchduck Road (Figure 4.6-4 "View 4") and Independence Boulevard (Figure 4.6-6 "View 6"), and potentially the Town Center Station would be more readily visible—both easier to see and with more potential viewers—than the at-grade portions of Alternative 1A. However, roadway overpasses are a routine part of the visual environment within the VBTES Corridor and would be located in areas of low visual sensitivity. Therefore these additional structures would not have an adverse impact on visual quality.

#### ALTERNATIVE 1B: Rosemont Alternative

Alternative 1B would have the same or very similar effects on the visual environment as Alternative 1A. The transit system would be visible only to viewers from abutting parcels and roadway users at crossings.

Alternative 2 would have the same visual effects as Alternative 1B from Newtown Road Station to the proposed Rosemont Station. East of the Rosemont Station, the alignment would be largely at-grade with transit overpasses at Lynnhaven Parkway and London Bridge Road. Similar to Alternative 1A and 1B, the transit system would be visible only to viewers from abutting parcels and roadway users at crossings. Abutting land uses are primarily commercial and industrial, with some residential areas. As shown in Figures 4.6-10 - 4.6-13, "Views 10, 11, 12, and 13," current viewsheds in this segment include the former NSRR tracks and the electrical transmission line. Future views would be of either LRT tracks and OCS or BRT guideway—both of which are similar to existing visual conditions.

The BRT version of Alternative 2 east of Birdneck Road would not affect the visual environment because it would operate within existing streets. The BRT version of Alternative 2 would run in existing streets on Birdneck Road and to the east, so there would be no change to the visual quality other than an increase in the number of buses. The LRT version of Alternative 2, adjacent to 17<sup>th</sup> Street and in the median of 19<sup>th</sup> Street, would have higher visibility than other parts of the alignment. Viewers along the roadway and adjacent land uses would see new tracks, OCS poles, and stations where presently there is a roadway, streetlights, and utility poles (See Figures 4.6-14 and 4.6-15, "Views 14 and 15"). The viewsheds in this segment are not considered to be sensitive, so the introduction of new vertical elements in the landscape would not impact the visual quality of the area.

#### ALTERNATIVE 3: Hilltop Alternative

Alternative 3 would have the same effects on the visual environment as Alternative 2 from the Newtown Road Station to east of London Bridge Creek. From immediately east of Parker Lane to approximately Phillip Avenue, the LRT version of Alternative 3 would be on a viaduct over the existing roadways and landscape. The area is near the existing I-264 elevated roadway, and an additional bridge structure over Virginia Beach Boulevard would be noticeable but not necessarily incompatible with existing views. East of Phillip Avenue, the alignment would be at-grade, operating in the median of Laskin Road with an overpass at First Colonial Road. The transit line would

continue at-grade on Laskin Road east of First Colonial Road toward Birdneck Road at which point it would turn on to the median of Birdneck Road and continue south to 19<sup>th</sup> Street. At 19<sup>th</sup> Street, the transit alignment again moves east to its terminus at the Oceanfront Resort Area. Abutting land uses are primarily commercial with some institutions, gas stations, office buildings, and residences. As shown in Figures 4.6-17 - 4.6-20, "Views 17, 18, 19, and 20", current viewsheds in this segment include utility poles and wires, commercial signage, and an electrical transmission line. As with Alternative 2, future views would include either LRT tracks and OCS or BRT guideway—both of which are similar to existing visual conditions.

The BRT version of Alternative 3 would run at-grade in the median of Laskin Road with an overpass at First Colonial Road. This alternative would not negatively impact the visual environment since it would operate at-grade in an existing urban street with the exception of the First Colonial Road overpass. The overhead structure between Parker Lane and Phillip Avenue would not be present with the BRT Alternative 3 because it would operate in existing streets. The LRT version of Alternative 3 would have higher visibility in the median of Birdneck Road and the median of 19<sup>th</sup> Street than other parts of the alignment. There would be no change on Birdneck Road for the BRT Alternative 3 because it would be in existing streets. Viewers along the roadway and adjacent land uses would see new tracks, OCS poles, and stations where presently there is a roadway, streetlights, and utility poles (See Figures 4.6-18 and 4.6-20, "Views 18 and 20"). Adding fixed guideway transit to this area would not impact the visual quality of the area because the viewsheds in this segment are not considered to be sensitive.

### 4.6.6 Avoidance, Minimization, and Mitigation

The build alternatives are not anticipated to have direct adverse effects on visual quality within the VBTES Corridor based on the following considerations:

- ~ Existing visual resources are predominantly suburban views that typically include industrial developments, strip developments, and multiple utility poles or other infrastructure.

- ~ Viewers (people) living in and moving through the VBTES Corridor would not expect views other than those typical of suburban development.
- ~ Build alternatives that would use the former NSRR ROW would occupy an unused freight rail corridor with limited visual quality and restricted views; the placement of an LRT or BRT system along the ROW would not substantially alter the existing views.
- ~ Build alternatives that would move off of the former NSRR ROW would travel on area roadways, either in the median or alongside. These roadways are also of limited visual quality, and a new LRT or BRT system would not substantially alter the existing views.
- ~ Most of the LRT or BRT system would be constructed at-grade and would limit any views to the immediate line-of-sight area. The exception would be those intersections where the LRT or BRT system is elevated over a busy roadway. These above-grade overpasses would be more visible, but are not atypical for an urban area, and they would not alter the VBTES Corridor's general viewshed.

The visual effects of the Virginia Beach transit extension have been considered in the development of the alternatives. High-quality design and construction of the proposed transit facilities would be important tools to maintain or enhance visual quality and aesthetics. Designing basic infrastructure components, embellishing basic infrastructure facilities, and enhancing the visual environment around the facilities would support the mitigation of visual impacts. The following techniques could be employed for any of the alternatives to improve the visual effects of the transit extension:

- ~ Applying special treatments and detailing to enhance the visual appearance of the transit system including items such as unique textures or patterns in concrete work and enhancing shelter structures and railings with details that go beyond the purely functional requirements.

- ~ Planting vegetation, street trees, and landscaping in and around the project where appropriate, with due consideration to security and safety and sustainability.
- ~ Giving special consideration to landscaping and visually compatible fencing where the alignment abuts public parks, open spaces, historic or cultural resources, and residential areas.
- ~ Designing station, Park & Ride, and maintenance facility lighting that would reduce impacts from light spill-over and glare into adjacent residential neighborhoods.
- ~ Minimizing structural bulk where appropriate.
- ~ Working with the City of Virginia Beach and the community to design facilities that would mitigate and/or enhance the visual environment to improve or the overall environment around the transit facilities. Specific treatments, if any, would be determined during the final design of the selected alternative.

The mitigation and enhancement measures discussed above represent a program to fit the proposed transit extension into existing urban and suburban settings and to improve and embellish the overall visual environments.

## 4.7 Safety and Security

This section identifies the legal safety and security requirements for federally funded transit projects, the existing safety conditions, and the degree to which the alternatives reduce or create the potential for injury or accident from on site or off-site hazards to personal safety and security. The assessment, focused on the local, project-vicinity level, examines potential impacts on safety during construction and operations, as well as construction and design features to reduce hazards and increase public safety.

### 4.7.1 Legal and Regulatory Context

Safety and security requirements for this project are addressed in FTA's Circular C 5800.1, Safety and Security Management Guidance for Major Capital Projects (2007). This document identifies the specific activities that a transit agency must perform and document in a Safety and Security

Management Plan (SSMP), which is part of the agency's Project Management Plan (PMP). The SSMP describes how safety and security would be addressed in all phases of the project's development, from planning through the start of revenue service. Hampton Roads Transit developed an SSMP for The Tide, which has been implemented. This document would be used as the basis for the SSMP for the project selected in the VBTES.

Additionally, the Commonwealth of Virginia Department of Rail and Public Transportation (DRPT) has responsibility for safety and security oversight of fixed guideway rail (but not bus) transit systems under USDOT regulation 49 CFR Part 659. DRPT is responsible for developing standards for transit system safety and security plans, approving safety and security plans, investigating certain types of accidents under 49 CFR Part 659, requiring corrective action plans to address safety deficiencies, and conducting regular reviews of the safety and security plans on at least a triennial basis.

### 4.7.2 Existing Safety Conditions

The existing conditions described below are applicable to the LRT and BRT technologies under consideration in the VBTES.

#### *Newtown Road Station to the Proposed Town Center Station along the Former NSRR ROW (Alternatives 1A, 1B, 2, and 3)*

The former NSRR ROW has many at-grade crossings of intersecting roadways, including major arterials, neighborhood streets, and private driveways. All of these crossings are currently inactive, as the freight rail service along the corridor has been formally abandoned for nearly 10 years. Between Newtown Road and Town Center, there are 12 at-grade crossings of the former NSRR ROW. Pedestrian crossings of the former NSRR ROW occur at the same locations as the roadways, but many of the streets do not currently have sidewalks. Informal crossings of the right of way occur in other locations as well; there are currently no fences or barriers to prevent unauthorized access or encroachments by adjacent property owners.

#### *Proposed Town Center Station to the Proposed Rosemont Station along the Former NSRR ROW (Alternatives 1B, 2, and 3)*

The existing conditions along the former NSRR ROW between the Town Center and Rosemont stations are similar to those identified in the Newtown Road to Town Center segment. There are seven crossings of the right of way in this area, including three streets in the neighborhood east of Thalia Creek (Fir Avenue, Thalia Road, and Budding Avenue) that are approximately 300 feet apart from each other. Pedestrian crossings of the former NSRR ROW occur at the same locations as the roadways, and informal crossings occur elsewhere. Some but not all of the roads that cross the former NSRR ROW have sidewalks. An open deck bridge over Thalia Creek is occasionally used by pedestrians going between the Town Center area and the neighborhoods east of the creek. The right of way does not have fences or barriers to prevent unauthorized access.

#### *East of the Proposed Rosemont Station to East of London Bridge Creek along the Former NSRR ROW (Alternatives 2 and 3)*

Between the proposed Rosemont Station and London Bridge Creek, the existing conditions along the former NSRR ROW are similar to the segments between Newtown Road and the Rosemont station. Five existing road crossings of the right of way are in this segment, and pedestrian crossings occur along streets and elsewhere along the tracks. There is an open deck railroad bridge over London Bridge Creek.

#### *East of London Bridge Creek to the Proposed Oceanfront Station via the Former NSRR ROW – 17<sup>th</sup> Street – 19<sup>th</sup> Street (Alternative 2)*

The existing conditions along the former NSRR ROW in this segment are similar to those described for the segments between Newtown Road and London Bridge Creek. There are 13 crossings of the former NSRR ROW, including private crossings between London Bridge Road and Air Station Drive that provide access to Navy property north of NAS Oceana, Upper Wolfsnare Plantation, and the City of Virginia Beach's Potters Road site.

Birdneck Road and Virginia Beach Boulevard are 4 lane urban arterials that carry high volumes of auto, bus, and truck traffic. Sidewalks are present on both sides of Birdneck Road and portions of Virginia Beach Boulevard, and there are many driveways along both roads. Major intersections of Birdneck Road at Norfolk Avenue and Birdneck Road at Virginia Beach Boulevard are controlled with traffic signals. Washington Avenue is a low-volume two lane road that is separated into two discontinuous parts at 18<sup>th</sup> Street: to the south, it connects Virginia Beach Boulevard directly to 18<sup>th</sup> Street; north of 18<sup>th</sup> Street, it serves as an internal circulation road for the Convention Center parking lots. Nineteenth Street is a four lane undivided roadway with sidewalks on both sides of the street and driveways providing access to residences and commercial uses. There are signalized intersections with pedestrian signals and crosswalks on 19<sup>th</sup> Street at Parks Avenue, Baltic Avenue, and Arctic Avenue.

*East of London Bridge Creek to the Proposed Oceanfront Station via Laskin Road – Birdneck Road – 19<sup>th</sup> Street (Alternative 3)*

Virginia Beach Boulevard, Laskin Road, and Birdneck Road are urban arterials that currently carry high volumes of auto, bus, and truck traffic. Virginia Beach Boulevard is an 8 lane arterial roadway with sidewalks on each side and many driveways for access to the businesses along the road. Laskin Road has 4 mainline lanes with parallel bi-directional service roads along most of its length and frequent median breaks to provide access between the mainline and service roads, as well as to the properties along the road. Sidewalks are located intermittently along Laskin Road, and in some locations pedestrians must walk on the grass or in the service roads. Major intersections are signalized, but most of these signals do not have dedicated pedestrian signals or crosswalks. Hampton Roads Transit operates bus service along Virginia Beach Boulevard and Laskin Road. Birdneck Road between Laskin Road and 19<sup>th</sup> Street is a four lane divided roadway with median breaks and left turn lanes. There are sidewalks and many driveways on both sides of Birdneck Road. Major intersections on Birdneck are signalized and have pedestrian signals and crosswalks. Between Birdneck Road and the Convention Center, 19<sup>th</sup> Street is a four lane undivided roadway with a sidewalk only

on the north side of the street west of the Convention Center parking lots. East of the Convention Center, 19<sup>th</sup> Street is the same as described above in Alternative 2.

### 4.7.3 Environmental Impacts

#### Traffic

The principal traffic safety consideration is to avoid collisions between transit vehicles and motor vehicles at grade crossings. Another consideration is limiting secondary accidents that may involve only the roadway vehicular mode as a result of transit vehicle activity or activation of the grade crossing warning system.

#### No Build Alternative

Under the No Build alternative, the VBTES project would not be constructed. There would be no changes to roads that intersect the former NSRR ROW other than those associated with the Witchduck Road project. The planned modifications to Laskin Road would improve traffic safety by eliminating potential vehicle conflicts associated with the existing parallel service roads.

#### ALTERNATIVE 1A: Town Center Alternative

The typical urban auto/pedestrian environment and types of traffic controls that exist today and are familiar to drivers in the corridor are similar to what would exist under Alternative 1A. Most at-grade crossings of the former NSRR ROW would become active once again, after having been out of use following the end of freight rail service. However, transit vehicle crossings would occur at greater frequencies and higher speeds than the former freight rail service. Standard traffic control devices such as railroad-style flashing lights, gates, and/or traffic signals would be used to control traffic at these crossings. Specific treatments would be identified at each crossing as part of an engineering study to take place during later phases of design. The transit vehicle horn and signal bells at each crossing would provide additional warning in advance of each crossing of an LRT vehicle. New structures would be constructed to elevate the LRT guideway over Witchduck Road, Independence Boulevard, and Market Street, eliminating the potential for transit/road vehicle collisions at these locations.

As discussed in **Section 2.1.1**, one driveway at the Princess Anne Road crossing would be relocated because it is immediately adjacent to the proposed tracks. The intersection of Princess Anne Road and Freight Lane would have a new traffic signal installed, which would be coordinated with the grade crossing signal to give vehicles waiting to turn onto Princess Anne Road a chance to clear the tracks before a train arrives. The crossing at South Lowther Drive would be closed, and access to the Dominion Virginia Power substation would be relocated by extending Southern Boulevard. Private crossings between Witchduck Road and Euclid Road would be closed, and access to the properties served by those crossings would be relocated to other streets. Two intersections near the Euclid Road crossing would be realigned to provide greater separation from the crossing and improve safety. A complete list of crossings can be found in **Appendix J**.

#### ALTERNATIVE 1B: Rosemont Alternative

The proposed conditions for Alternative 1B are similar to those described for Alternative 1A. As described in **Section 2.1.1**, crossings of the former NSRR ROW at Fir Avenue, Thalia Road, and Budding Avenue are located within 600 feet of each other. In order to improve safety by reducing the number of potential conflicts between road vehicles and light rail vehicles, the Fir Avenue and Budding Avenue crossings would be closed, and all traffic across the right of way in the neighborhood would use Thalia Avenue or another crossing (such as Constitution Drive or Kentucky Avenue). A private driveway across the right of way would be closed and relocated to another location that does not require crossing the tracks.

#### ALTERNATIVE 2: NSRR Alternative

Along the former NSRR ROW, the proposed conditions for Alternative 2 are similar to those described for Alternatives 1A and 1B. Grade separated crossings of Rosemont Road, Lynnhaven Parkway, and London Bridge Road would be added. A private crossing to provide access to a cellular telephone tower east of North Plaza Trail would be closed, and a new driveway would be constructed in another location. A private crossing to serve vacant property owned by the U.S. Navy north of NAS Oceana would remain but with locked gates and limited access as needed. A driveway

for Upper Wolfsnare Plantation would be relocated to run along the north side of the former NSRR ROW to connect to the access to the City of Virginia Beach's Potters Road site, which would continue to remain open as the access to the proposed VSMF and North Oceana Station Park & Ride.

The LRT guideway in the median of Birdneck Road would introduce a new type of traffic condition along the arterial roadway. Traffic signals in conjunction with other traffic control devices such as gates would be used to control roadway traffic and transit vehicles at each intersection. Traffic movements across an exclusive LRT guideway would only occur during protected signal phases. Where the LRT would operate in the center of 19<sup>th</sup> Street, transit and roadway vehicles would also be controlled with traffic signals, but gates would not be used due to the low speeds involved.

#### ALTERNATIVE 3: Hilltop Alternative

The proposed conditions for Alternative 3 along the former NSRR ROW are the same as those described for Alternatives 1A, 1B, and 2 from Newtown Road to east of London Bridge Creek. There would be grade separated crossings over Rosemont Road, Lynnhaven Parkway, Virginia Beach Boulevard, Great Neck Road, the westbound lanes of Laskin Road, an on-ramp from westbound Laskin Road to westbound I-264, and First Colonial Road.

Where the LRT guideway would operate in the median of Laskin Road, this would introduce a new type of traffic condition along the arterial roadway. Traffic signals and traffic control devices such as gates would be used to control road vehicles and transit vehicles at each intersection. Traffic movements across the exclusive LRT guideway would only occur at signalized intersections with protected signal phases. All unsignalized median openings that would allow crossing of the tracks would be removed. The reconstruction of Laskin Road between Phillip Avenue and Birdneck Road would also remove the parallel service roads, changing access to allow only right turns in and out of many properties.

Along Birdneck Road and 19<sup>th</sup> Street, crossings of the LRT guideway would occur at signalized intersections without gates, similar to the 19<sup>th</sup> Street segment of Alternative 2.

### BRT Alternatives

For BRT alternatives that operate along the former NSRR ROW, transit vehicle crossings would be similar to those described to the corresponding LRT alternatives. At-grade crossings would be equipped with standard traffic control devices such as traffic signals and gates. Specific treatments would be identified at each crossing as part of an engineering study to take place during later phases of design. Grade separations would be at the locations listed in **Chapter 2**, and at-grade crossings would be as listed in **Appendix J**. BRT vehicles would not be required to use horns or bells prior to entering crossings, however.

In Alternative 2, BRT vehicles would operate in mixed traffic along the curb lanes of Birdneck Road and 19<sup>th</sup> Street east of the former NSRR ROW. BRT vehicles in Alternative 3 would operate in mixed traffic along Virginia Beach Boulevard and Laskin Road from Parker Lane to Phillip Avenue (instead of the grade separated structure that would be in the LRT version of Alternative 3), Birdneck Road from Laskin Road to 19<sup>th</sup> Street, and along 19<sup>th</sup> Street to the Oceanfront Station. This would be a familiar situation for drivers and pedestrians similar to existing bus operations.

### Pedestrian and Bicycle Safety

Pedestrian crossings of the LRT tracks or BRT guideway would be restricted to designated locations along the alignment, usually at signalized road intersections and stations. Fences would be installed along portions of the former NSRR ROW to prevent access to the transit guideway outside of the designated crossings. The exact locations of fences would be determined during later phases of design. Where the guideway is in a roadway median, fencing or other barriers such as bollards and chains would be used to prevent mid-block pedestrian crossings. The specific locations of fences and pedestrian barriers would be determined during final design. Signs would be placed to warn pedestrians to look for trains, and ADA-compliant detectable warning tiles would be used in advance of each crossing. Sidewalks and pedestrian signals with crosswalks would be included in the design of roadways that would be constructed along with the transit guideway. The design of crosswalks,

intersections, and BRT and LRT crossings would conform to HRT design criteria, American Association of State Highway Transportation Officials (AASHTO) guidelines, and applicable state and local standards.

Bicycle users would cross the LRT or BRT alignment at designated locations, similar to other vehicles on the roads or pedestrians on sidewalks. At LRT crossings and in embedded track, there will be a gap in the pavement next to each rail to allow the flange of the vehicle wheel to pass. This gap will be designed in accordance with AASHTO recommendations, state and local standards, and Americans with Disabilities Act requirements. When bicycles cross tracks at or near a 90 degree angle, this is typically not a problem; however, bicycle wheels could become caught in the gap, potentially resulting in crashes. None of the LRT alignments under consideration include segments where the LRT tracks are shared with bicycles or motor vehicles except at designated crossings. Almost all crossings are proposed to be at or close to a 90 degree angle, which is the safest for bicycles. Where tracks are located in exclusive lanes adjacent to roadway traffic (such as on Birdneck Road or 19<sup>th</sup> Street in Alternatives 2 and 3), the design would include curbs or other features to separate the lanes and discourage bicycles from riding on the tracks.

### Station Area Safety and Security

Pedestrian circulation in and around the BRT and LRT stations would consist of highly visible walkways with sufficient lighting at each facility to provide a safe and comfortable environment for transit patrons. Throughout the system, passengers would access stations via sidewalks as they do today with bus stops and light rail stations on The Tide in Norfolk. Stations elevated on bridge structures would include elevators and stair towers to reach the platform from ground level. Whenever possible, pedestrian paths would be designed to avoid crossing or passing through BRT routes, LRT tracks, access driveways, and parking areas. Where such crossings occur, they would be identified with standard pavement markings and signs. Fencing or barriers would be placed where there is a particular concern about pedestrian safety; these locations would be identified during the design of the station areas.

Access to the BRT and LRT stations in the roadway median of Laskin Road and Birdneck Road (Alternative 3) would be via crosswalks at signal-controlled intersections. All pedestrian paths would be accessible to individuals with disabilities.

To the extent possible, station areas would be designed using Crime Prevention through Environmental Design (CPTED) principles. CPTED uses the layout of the facility to influence safety. For example, designs that include open spaces and unobstructed areas allow the public and security personnel to observe activities within the area, thereby deterring crime. Paths would be visible from on-site access drives, parking areas, and adjacent streets. Security cameras and emergency call boxes would be placed on all station platforms and in park and ride lots and monitored from HRT's Operations Control Center. Lighting would be provided at all outdoor plazas, pedestrian walkways, parking lots, entrance and exit roadways, and vehicular traffic areas within the station areas. The lighting design at station areas would attempt to minimize "spill" light and objectionable glare that might affect adjacent properties and roadways.

Station areas would be patrolled by Hampton Roads Transit security staff, local police, and contracted security services.

### Vehicles

Security of the passengers on board BRT or LRT vehicles would be monitored by the vehicle operator and roving fare inspectors. Cameras are located on board each vehicle to allow for observation of activities in the passenger areas as well as outside the vehicles. Hampton Roads Transit staff and local police would be responsible for patrolling the transit vehicles. Call boxes are in place on the vehicles for passengers to speak with the operator if necessary, and vehicle operators have radio communications to the Operations Control Center.

### 4.7.4 Construction Impacts

Construction of the BRT or LRT alternatives would involve typical roadway or railroad construction techniques for the at-grade guideway and overhead structures. Construction in the vicinity of the Dominion Virginia Power high voltage

power transmission lines along the alignments would require precautions to be taken to ensure safety of construction workers, but otherwise there are no particularly dangerous or unusual circumstances anticipated. Construction safety practices established by industry standards, government regulations, codes, and project specifications would reduce the potential for accidents and other safety problems. Some construction activities would require temporary detours or lane closures. Maintenance of traffic plans would be developed as part of the project's design to identify appropriate detours and work area protection measures for construction in or adjacent to roadways.

Informational and educational safety campaigns for drivers, pedestrians, and transit users would begin prior to the start of operations for any Build alternative.

### 4.7.5 Indirect Effects

The construction of any of the BRT or LRT alternatives may result in an increase in the number of pedestrians or bicycles crossing or using facilities near the alignments. Roads, sidewalks, and trails outside the immediate vicinity of the build alternatives might not be designed to support the increase in pedestrian and bicycle activity. There may be an additional safety and security risk associated with the increase in pedestrian and bicycle activity.

### 4.7.6 Avoidance, Minimization, and Mitigation

At each at-grade crossing of the LRT or BRT alignments, standard traffic control devices would be installed. The specific treatments to be installed at each crossing will be evaluated through an engineering study during later phases of the project's design. The design would take into account all users, including transit vehicles, motor vehicles, bicycles, and pedestrians. Fences and other barriers would be placed along the alignments to discourage unauthorized people from accessing the transit guideway.

Stations, parking lots, and other facilities that are part of the build alternatives would be designed with safety in mind. Crime Prevention through Environmental Design principles would be incorporated at station area sites where possible,

and all facilities would be equipped with security cameras. Regular monitoring by police, security, and operations personnel would serve as a deterrent against crime.

4.8 Community Facilities

This section focuses on community facilities and community cohesion in the VBTES Corridor and potential impacts related to the construction and operation of a fixed guideway transit system. Community facilities refer to public institutions that serve the general welfare of the City of Virginia Beach, such as fire and police protection, as well as religious institutions. Governmental, cultural, medical, and community oriented establishments are also included in this section. Each of these facilities is an integral component of promoting safe, accessible, and healthy communities, and they would benefit from a high capacity, reliable transit system.

Community cohesion refers to the interconnectivity of residential areas that share similar economic and demographic conditions, levels of accessibility, and general visions for the future. The City’s comprehensive plan addresses this idea through recommendations that are focused on maintaining and enhancing neighborhood quality, improving open spaces and transit connectivity, and ensuring future development does not negatively influence existing land use patterns. Generally, community cohesion reflects the common interests of neighborhood residents, connections based on a shared history, and similar neighborhood conditions.

4.8.1 Methodology

The analysis established a one-half mile buffer for the build alternatives and identified the community facilities found within the buffer area. These components and the boundaries of SGAs within the VBTES Corridor formed the extent of the study area. Data was obtained from the City of Virginia Beach and analyzed using GIS mapping. **Figure 4.8-1**

shows the locations of community facilities and **Table 4.8-1** lists the community facilities in the study area along the VBTES Corridor. Community facilities analyzed include schools, public services, such as fire and police, community services, churches, cultural destinations, and medical establishments.

The limit of disturbance (LOD) was also applied to determine whether any community facilities would be displaced within proposed station areas or impacted by proposed alignments for the build alternatives.

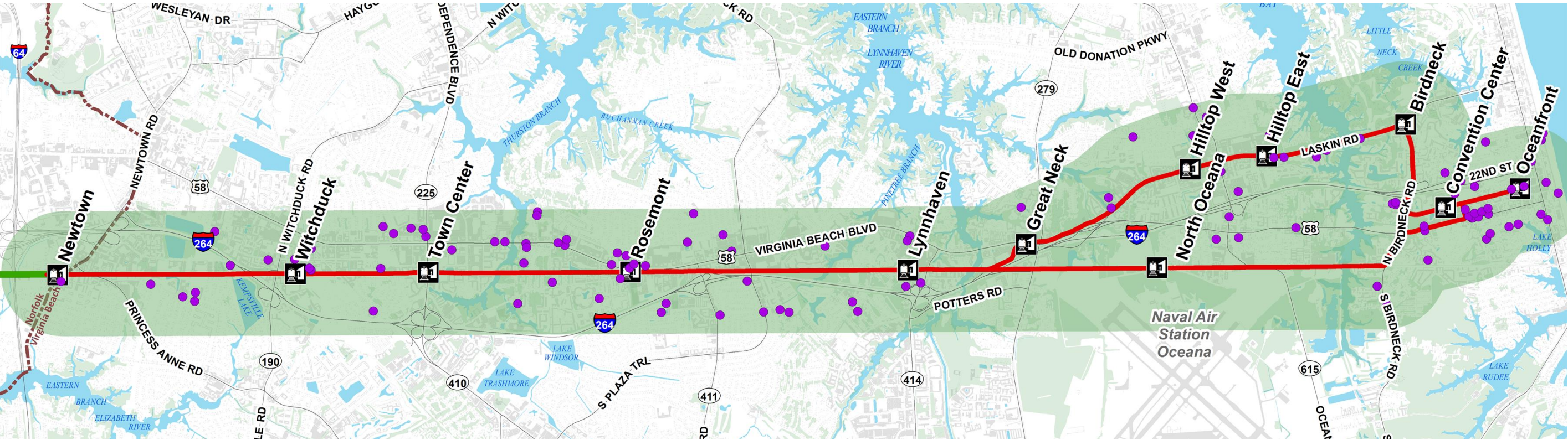
4.8.2 Existing Conditions

There are a variety of community facilities present throughout the VBTES Corridor. Churches are the most represented community facility in the VBTES Corridor with 42 establishments. A variety of public services, including police and fire protection, are also present. Police and fire services in the VBTES Corridor are largely anchored within the Resort SGA. Community services are also found within the VBTES

Corridor, including community centers and medical facilities. Medical facilities, which include inpatient and outpatient services, as well as assisted and independent living establishments, are located throughout the study area.

Virginia Beach City Public Schools operates nine schools in the VBTES Corridor, ranging from elementary education to alternative education programs. Licensed day care centers are widespread in the study area, with 12 locations providing childcare services. Regarding local government, there is a collection of offices clustered in the Town Center of Virginia Beach within the Pembroke SGA. Among the City departments located in the Town Center of Virginia Beach are Economic Development and the Strategic Growth Area office. Additionally, a branch of the Department of Health and Human Services is located within the Rosemont SGA. The VBTES Corridor also includes some museums and cultural attractions, particularly in the Resort SGA. In total, 96 establishments classified as community facilities are present in the VBTES Corridor (**Figure 4.8-1**).

Figure 4.8-1 | Community Facilities in the VBTES Corridor



Source: HDR, 2014

Table 4.8-1 | Community Facilities in VBTES Corridor

Community Facilities					
Category	ALTERNATIVE				Facility Name
	1A	1B	2	3	
Medical		•	•	•	Beacon Shores Rehabilitation
		•	•	•	River Pointe Rehabilitation and Health Center
			•	•	Free/ACT Clinic
Schools	•	•	•	•	Point 'O View Elementary
	•	•	•	•	Renaissance Academy
		•	•	•	Adult Learning Center
		•	•	•	Princess Anne High School
		•	•	•	Thalia Elementary
			•	•	Cooke Elementary
			•	•	Lynnhaven Elementary
			•	•	Malibu Elementary
			•	•	Virginia Beach Middle School
		•	•	•	Meyera B. Oberndorf Central Library
Library			•	•	Oceanfront Library
	•	•	•	•	Thalia Fire Station
Fire			•	•	Beach Borough Fire Station
			•	•	Law Enforcement Training Academy (LETA)
Police			•	•	Second Police Precinct
			•	•	Museum of Contemporary Art (MOCA)
Museum			•	•	The Old Coast Guard Station
			•	•	Francis Land House
	•	•	•	•	Witchduck Post Office
Post Office			•	•	Atlantic Post Office
				•	Hilltop Post Office
	•	•	•	•	City of Virginia Beach Health Department
Government	•	•	•	•	City of Virginia Beach Treasurer
	•	•	•	•	City of Virginia Beach Economic Development
		•	•	•	City of Virginia Beach Department of Human Services
		•	•	•	Supportive Living Program (SLP) Group Home
			•	•	Lighthouse Center
			•	•	EMS 14
Community Center			•		Joseph Grimstead Senior Seatack Recreation Center
				•	Hilltop Family YMCA

Source: City of Virginia Beach, 2014

Community Facilities					
Category	ALTERNATIVE				Facility Name
	1A	1B	2	3	
Assisted Living	•	•	•	•	Marian Manor
	•	•	•	•	Silver Hill at Thalia
	•	•	•	•	Lynn Shores Chateau
	•	•	•	•	Sentara Village
	•	•	•	•	Sentara Nursing Center
			•	•	Assisted Living at Pritchard Road
			•	•	Luther Manor
				•	Russell House
				•	First Colonial Inn
	•	•	•	•	Little Angels Preschool
Day Care		•	•	•	Rainbow II Preschool and Daycare
		•	•	•	Our Future Child Care Center
		•	•	•	Kindercare Learning Center
			•	•	Harbour Tugboats
			•	•	Star of the Sea School
			•	•	Primary Colors Child Care Center
			•	•	JCOC Oceanfront Preschool
			•	•	Academy of Early Learning
			•	•	Atlantis Head Start Center
			•		Heavenly Sent Child Care
Churches				•	Children's Learning Paradise
	•	•	•	•	Holland Road Baptist
	•	•	•	•	Holy Cross
	•	•	•	•	Church of Acts
	•	•	•	•	Kempsville Church of Christ
	•	•	•	•	Joshua Mission
	•	•	•	•	Kingdom Life
	•	•	•	•	Gates of Heaven
	•	•	•	•	Church and Christian Support
	•	•	•	•	Tidewater Central
	•	•	•	•	Grace Tabernacle

Community Facilities					
Category	ALTERNATIVE				Facility Name
	1A	1B	2	3	
Churches		•	•	•	Thalia Lynn Baptist
		•	•	•	New Faith
		•	•	•	Thalia Trinity Presbyterian
		•	•	•	Emmanuel Lutheran
		•	•	•	Revival Temple
		•	•	•	Thalia United
		•	•	•	Thalia United Methodist
			•	•	First Chinese Baptist
			•	•	London Bridge Baptist
			•	•	Mount Olive Baptist
			•	•	New Hope Baptist
			•	•	Pentecostal Church
			•	•	Star of the Sea
			•	•	Faith Temple
			•	•	Mission Temple
			•	•	Emmanuel Tabernacle
			•	•	Foundry United Methodist
			•	•	Princess Anne Plaza Methodist
			•	•	Virginia Beach Methodist
			•	•	Lynnhaven Presbyterian
			•	•	Scott Memorial United Methodist
			•	•	Eastern Shore Chapel
			•		Church of Christ Oceana
			•		Rehoboth Baptist
				•	First Colonial Baptist
				•	First Church of Christ
				•	Church of God
				•	Good Shepherd Lutheran
				•	Freedom Fellowship
				•	St. Nicholas Greek Orthodox Church
				•	Virginia Beach Community Chapel
				•	Virginia Beach Friends Meeting



### 4.8.3 Environmental Impacts

#### No Build Alternative

The No Build alternative would not have an affect on community facilities or community cohesion in the VBTES Corridor. The implementation of fixed guideway transit would not occur, and any related construction or operational impacts would not be expected. The existing transportation network would continue to function within its current parameters, incorporating the planned roadway enhancements described in **Chapter 2, Section 2.2-1**. The current public transportation system would not be complemented with the reliability of fixed guideway transit service and community facilities along the VBTES Corridor would not have access to an alternative transportation mode.

#### LRT Build Alternatives

##### ALTERNATIVE 1A: Town Center Alternative

**Table 4.8-1** lists community facilities within the study area of the build alternatives. One school and two churches are located within a one-half mile of Alternative 1A. Point O'View Elementary School, which is located east of Newtown Road and is accessible from Parliament Drive south of the proposed alignment, could expect minor changes in visual quality with the installation of the overhead contact system (OCS) associated with LRT. However, considering Alternative 1A would operate exclusively in the former NSRR ROW, an established transportation corridor, significant visual impacts are not expected.

Two churches located off Greenwich Road just west of Bowery Street and north of the proposed alignment could be expected to experience noise related impacts associated with the installation and operation of signalized gates where the alignment would intersect Greenwich Road. Greater detail on visual quality and noise and vibration are provided in **Sections 4.6** and **5.8**, respectively.

Community cohesion and connectivity between neighborhoods and community facilities is not expected to be impacted because Alternative 1A would operate within

the former NSRR ROW and would not limit access to existing neighborhoods along the VBTES Corridor. Rather, a new transit system could strengthen the connections between communities along Alternative 1A as neighborhoods near the Newtown and Pembroke SGAs and proposed stations would have access to additional transportation choices.

##### ALTERNATIVE 1B: Rosemont Alternative

Community facilities within the one-half mile buffer of Alternative 1B are primarily located along the main arterials in the study area, including Virginia Beach Boulevard and Bonney Road. Alternative 1B extending from the proposed Town Center station to the proposed Rosemont Station would operate exclusively within the former NSRR ROW through an already developed auto-centric commercial corridor. The operation of LRT would not cause negative impacts to existing community facilities or impact community cohesion.

##### ALTERNATIVE 2: NSRR Alternative

No additional impacts to community facilities or community cohesion beyond those previously described for Alternatives 1A and 1B are expected for Alternative 2. All community facilities within the Alternative 2 study area are located outside the LOD and would not experience adverse effects.

##### ALTERNATIVE 3: Hilltop Alternative

Community facilities that are within one-half mile of Alternative 3 include the school and churches previously described as well as another church, Eastern Shore Chapel, which is located near the intersection of Laskin Road and Phillip Avenue. Alternative 3 would transition from operating on an elevated structure to travelling at-grade in the median of Laskin Road near the intersection of Laskin Road and Phillip Avenue. Eastern Shore Chapel, accessible from the westbound feeder road north of Laskin Road and from Eastern Shore Chapel Road, would experience impacts to visual quality related to the bridge structure that would be necessary to take the Alternative 3 transit alignment from the NSRR ROW into the median of Laskin Road. Any adverse effects would be limited to visual aesthetics. Noise impacts are expected to be minimal considering the

intersection of Laskin Road and Phillip Avenue, just to the east of Eastern Shore Chapel, would be signalized and would not operate as a gated crossing.

As Laskin Road functions as a commercial corridor with residential neighborhoods to the north and south, community cohesion is not anticipated to be negatively affected. Rather, safety improvements to Laskin Road associated with the implementation of transit, such as signalized crossings at the proposed station locations, would better connect communities along Laskin Road.

#### BRT Build Alternatives

The BRT build alternatives would follow the routes described for the LRT build alternatives and similar impacts to community facilities in the VBTES Corridor would be anticipated. Visual impacts would not occur if BRT technology is selected because the BRT vehicles would not require OCS poles to operate.

### 4.8.4 Construction Impacts

Short term construction impacts are not anticipated for the majority of community facilities along the VBTES corridor. Five churches within a one-half mile of Alternative 3 on Laskin Road: Eastern Shore Chapel, First Church of Christ, Good Shepherd Lutheran, Virginia Beach Community Chapel, and Friends Meeting, could expect minor access impacts during the construction phase. Parking should not be affected and the temporary construction impacts would not outweigh the potential benefits of fixed guideway transit.

### 4.8.5 Indirect Effects

The potential indirect effects of the build alternatives include improved accessibility for community facilities in the VBTES Corridor located near proposed transit stations. Additional indirect effects that could be attributed to the build alternatives are the potential development of community facilities within the proposed station areas and along the VBTES Corridor, which supports the City's comprehensive planning measures focused on improving transit accessibility and quality of life for residents.

### 4.8.6 Avoidance, Mitigation, and Minimization

Coordinated efforts during the construction phase to limit impacts to community facilities along Laskin Road, which could experience temporary access changes, would be implemented through the adoption of a maintenance of traffic plan. The maintenance of traffic plan would outline measures that would ensure that accessibility is maintained. Additional mitigation efforts would focus on visual quality and noise impacts near identified community facilities, as well as more generally throughout the study area. Greater detail on these topics is provided in previous sections of this document.

# Chapter 5 | Environmental Effects

Chapter 5





## 5.0 Environmental Effects

**Chapter 5.0** assesses the effects on the natural environment related to the No Build and build alternatives in the VBTES Corridor. This chapter addresses the following environmental resources: soils and farmland (**Section 5.1**); surface water, groundwater, and water quality (**Section 5.2**); wetlands (**Section 5.3**); floodplains (**Section 5.4**); navigable waterways (**Section 5.5**); habitat and wildlife (**Section 5.6**); air quality (**Section 5.7**); noise and vibration (**Section 5.8**); hazardous materials (**Section 5.9**); and energy use (**Section 5.10**).

### 5.1 Soils and Farmland

This section presents information about the potential effects to farmlands and soils important to agricultural production within the VBTES Corridor that would result from the build alternatives.

#### 5.1.1 Legal and Regulatory Context

The Farmland Protection Policy Act (FPPA) of 1981 (7 USC 4201 et seq.) was enacted in order to protect farmlands and to prevent disturbance to soils important to agricultural production. The FPPA seeks to assure that federal programs are administered to be compatible with state, local government, and private programs and policies to protect farmland, and to minimize the impact that federal programs have on the unnecessary and irreversible conversion of farmland to nonagricultural uses.

The City of Virginia Beach established an Agricultural Reserve Program (ARP) in 1995 through the passage of the Agricultural Lands Preservation Ordinance (Appendix J, Virginia Beach City Code). To be eligible for inclusion in the program, parcels must be no less than 10 acres, be located within a residential zoning district, be capable of being subdivided or developed for non-agricultural purposes, and be located south of the City's Green Line as delineated in the City's Comprehensive Plan. The Green Line is well south of the VBTES Corridor; therefore, lands within the VBTES Corridor are not subject to the City's ARP ordinance.

#### 5.1.2 Methodology

The FPPA establishes criteria for determining whether the actions of a project are subject to the FPPA and guidelines for using the criteria. The methods for implementing the FPPA are defined in 7 CFR Part 658. Where farmlands are converted to other uses, the Farmland Conversion Impact Rating Form (NRCS form CPA-06 for corridor projects) may be required.

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) recognizes two basic groups of important farmland soils: prime farmland soils and additional farmland soils of statewide importance. According to the NRCS, prime farmland is:

*[...] land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and that is available for these uses. It has the combination of soil properties, growing season, and moisture supply needed to produce sustained high yields of crops in an economic manner if it is treated and managed according to acceptable farming methods. Prime farmland has an adequate and dependable water supply from precipitation or irrigation, a favorable temperature and growing season, an acceptable level of acidity or alkalinity, an acceptable content of salt or sodium, and few or no rocks. Its soils are permeable to water and air. Prime farmland is not excessively eroded or saturated with water for long periods of time, and it either does not flood frequently during the growing season or is protected from flooding. (NRCS National Soil Survey Handbook, Part 622, 2008)*

Additional farmland soils of statewide importance are not as high quality as prime farmland soils but are still important for the economical production of high yield crops.

The NRCS Soil Survey Geographic (SSURGO) database also identifies soils that are potential prime farmland if drained. Land does not have to be in use for agricultural purposes to be considered prime farmland; however, urban or built-up land and water areas cannot be considered prime farmland.

SSURGO data identifies prime farmlands within the VBTES Corridor; however, 2010 Census Bureau maps identify the

entire VBTES Corridor to be "urbanized area" and thus exempt from protection by the FPPA.

Although the VBTES would not be subject to review under FPPA, an assessment was conducted to determine whether the build alternatives under consideration would eliminate or reduce access to existing farmland adjacent to NAS Oceana. In the analysis that follows, a direct impact is defined as the permanent loss of prime farmland soils, as defined by NRCS, or active farmlands due to the project footprint. Indirect impacts may include reducing or eliminating access to farmland or reducing farmland to a size or configuration that is no longer considered by farmers to be economically viable.

#### 5.1.3 Existing Conditions

The VBTES Corridor lies within the Tidewater region of the Mid-Atlantic Coastal Plain, which has characteristically flat to gentle rolling topography. The land is often underlain by unconsolidated lower terrace sediments of the Quaternary age. Alluvial sand and silt, estuarine sand and silt, saline marsh deposits, and marine sand, silt, and clay are common.

The pre-Holocene geology of the Virginia Coastal Plain consists of igneous and metamorphic rocks of Precambrian and Paleozoic age overlain by a series of sedimentary deposits dating to the Cretaceous. The sedimentary deposits have been characterized by the continued deposition of clays, silts, sands, gravels, and peat bogs. The Late Pleistocene-Holocene geology of the Virginia Coastal Plain has mostly been characterized by marine transgression onto the land, filling what is today known as the Chesapeake Bay.

During heavy rain events, the generally flat topography and low elevation in relation to sea level impedes stormwater runoff throughout most of the VBTES Corridor thereby creating inundated conditions within and adjacent to the VBTES Corridor. According to the NRCS soils data, approximately 85% of the VBTES Corridor is underlain with hydric or partially hydric soils (SSURGO 2011). Hydric soils are characterized as being subjected to prolonged periods of saturation or inundation, both past and present, creating anaerobic conditions in the upper portion of the soil profile.

Hydric soils and how they are regulated are discussed in detail in **Section 5.3, Wetlands**.

While most soil in and around the VBTES Corridor has been influenced by human activities to some degree, some areas have been affected enough to warrant a separate classification (Urban Land). Urban Land or Udothents soils comprise approximately one-third of the VBTES Corridor (SSURGO, 2011). Urban land is defined as soil covered by fill material to a depth of 18" or more, or areas where all or most of the original soil has been cut away (Efland and Pouyat 1997, 219). The remaining portion of the VBTES Corridor is made up of loams, silt loams, and fine sandy loams generally in upland areas.

The majority of soils in the urbanized VBTES Corridor have been subjected to grading and filling activities associated with rail bed construction, roadway construction, access drives, etc. Other areas in the VBTES Corridor have undergone residential, commercial, or industrial development, or are part of NAS Oceana.

There are a few isolated areas of prime farmland soil in the VBTES Corridor and two areas of active farmland directly south of the VBTES Corridor (see **Figure 5.1-1**). The two areas that are being actively farmed lie within the boundary of NAS Oceana, although the area north of Potters Road is outside of the facility's fence line. Both areas reside within NAS Oceana clear zones where development is severely restricted.

Although soils identified as potential prime farmland within the SSURGO data occur within much of the VBTES Corridor, the VBTES Corridor is within an area committed to urban development. Furthermore, most of these soils would require drainage to serve as productive farmland. As such, conversion to farmland or agricultural use is unlikely. SSURGO data does not identify any farmland soils of statewide importance within the VBTES Corridor.

#### 5.1.4 Environmental Impacts

##### No Build Alternative

Under the No Build alternative, the VBTES project would not be undertaken. The No Build alternative would not adversely impact active farmland. Although soils classified

Figure 5.1-1 | Areas Adjacent to the VBTES Corridor Under Active Cultivation



Source: HDR, 2013

as prime farmland by NRCS would be disturbed under the No Build alternative (especially along the Laskin Road corridor), these soils lie within an urbanized area, and thus there would be no impact.

#### LRT Build Alternatives

##### ALTERNATIVE 1A: Town Center Alternative

The construction of Alternative 1A would directly impact approximately three miles of the existing 66-foot-wide former NSRR ROW. During construction of the light rail system, between 24 and 36 inches of topsoil would be removed across the length and width of the VBTES Corridor between the Newtown Road Station and the Town Center

Station, and angled drainage ditches, up to four feet deep, would be constructed on the north and south sides of the tracks. Additional soil disturbance would occur along the periphery of the alignment due to the movement of construction equipment. New stations, each with Park & Ride facilities, would be constructed at Witchduck and Town Center. These stations and associated parking would extend outside of the former NSRR ROW.

The LRT version of Alternative 1A would generally follow the existing topography (except at grade separations), and thus no distinctive topographic or subsurface features would be affected by the construction and operation of the light rail

system. Substantial soil disturbance would occur within the former NSRR ROW over the short-term, at the stations and Park & Ride lots, along the maintenance road, at the substations, and within construction staging areas. However, the majority of the soils within these areas have already been subject to significant disturbance (due to prior development and land clearing activities), and thus there would be little impact to native soils as a result of light rail guideway and station development.

Although potential prime farmland soils do exist within the VBTES Corridor, they would require drainage to be actively farmed. In addition, the VBTES Corridor is located within an

area committed to urban development, and the conversion of the potential prime farmland to active farmland is highly unlikely.

##### ALTERNATIVE 1B: Rosemont Alternative

Alternative 1B would extend from the Town Center Station approximately 1.8 additional miles east to the proposed Rosemont Station. Soil disturbance for Alternative 1B would be similar in character to that described for Alternative 1A. In addition to the stations described in Alternative 1A, a new station with a Park & Ride facility would be constructed west of Rosemont Road. The station and associated parking would extend outside of the former NSRR ROW.

Although potential prime farmland soils do exist within the VBTES Corridor, they would require drainage to be actively farmed. In addition, the VBTES Corridor is located within an area committed to urban development, and thus the conversion of the potential prime farmland to active farmland is highly unlikely.

##### ALTERNATIVE 2: NSRR Alternative

Under the LRT version of Alternative 2, soil disturbance and impacts would be similar to those described for Alternatives 1A and 1B, only occurring along an extended VBTES Corridor with additional stations at Lynnhaven, North Oceana, the Convention Center, and Oceanfront. Proposed Park & Ride facilities would extend beyond the width of the former NSRR ROW at the Lynnhaven and North Oceana stations. In addition, there would be a VSMF located north of Potters Road adjacent to the North Oceana Station. Additional soil disturbance could occur along the edges of the ROW due to the movement of construction vehicles.

In the portion of the Alternative 2 alignment east of Birdneck Road, soil disturbance would be similar to that described for Alternatives 1A and 1B, however the majority would occur within existing roadways. In addition, soil disturbance would occur at the Convention Center and Oceanfront Stations. However, the majority of the soils within these areas have already been subject to significant disturbance (due to prior development and land clearing activities), and thus there would be little impact to native soils as a result of light rail guideway and station development. Although SSURGO data identifies prime

farmland soils within the VBTES Corridor under Alternative 2, these areas are isolated and are generally developed with buildings, surface parking, and roadways. In addition, they are exempt from protection under the FPPA because they lie within an “urbanized area” as classified by the U.S. Census Bureau.

#### ALTERNATIVE 3: Hilltop Alternative

Under the LRT version of Alternative 3, soil disturbance and impacts would be similar to those described for Alternatives 1A, 1B, and 2 in the former NSRR ROW west of the proposed VSMF site, including the Lynnhaven Station and Park & Ride. East of London Bridge Creek, stations would be located at Great Neck, Hilltop West, Hilltop East, Birdneck, Convention Center, and Oceanfront. These stations and Park & Ride lots at Great Neck, Hilltop East, and Birdneck would extend beyond the width of the existing roadway ROW. There would be a VSMF located north of Potters Road, as described for Alternative 2. Additional soil disturbance could occur along the edges of the ROW due to the movement of construction vehicles.

Soil disturbance between Great Neck Road and the Oceanfront under Alternative 3 would be similar to that described for Alternatives 1A, 1B, and 2; however, the majority would occur within existing roadway rights-of-way, including Laskin Road, Birdneck Road, and 19<sup>th</sup> Street. In addition, substantial soil disturbance would occur at the station sites with Park & Ride lots. However, the majority of the soils within these areas have already been subject to significant disturbance (due to prior development and land clearing activities), and thus there would be little impact to native soils as a result of light rail guideway and station development. Although SSURGO data identifies prime farmland soils within the VBTES Corridor under the Hilltop Alternative, these areas are isolated and are generally developed with buildings, surface parking, and roadways. In addition, they are exempt from protection under the FPPA because they lie within an “urbanized area” as classified by the U.S. Census Bureau. Although potential prime farmland soils do exist within the VBTES Corridor, they would require drainage to be actively farmed. In addition, the VBTES Corridor is located within an area committed to urban development, and thus the conversion of the potential prime farmland soils to active farmland is unlikely.

#### LRT Vehicle Storage and Maintenance Facility

A vehicle storage and maintenance facility (VSMF) would be established north of Potters Road, north of and adjacent to the former NSRR ROW. The site surface is largely fill material from previous dredge disposal activities administered by the City of Virginia Beach and contains no soils suitable for farming.

#### BRT Build Alternatives

As described in **Chapter 2.0**, all of the BRT alternatives would be generally located along the previously described LRT alternatives’ routes. Therefore, the BRT version of Alternatives 1A, 1B, 2, and 3 would have substantially similar effects as their corresponding LRT versions.

#### 5.1.5 Construction Impacts

As detailed in **Section 5.1.4**, there would be substantial soil disturbance under the No Build alternative due to the Laskin Road widening project. There would also be substantial soil disturbance during construction activities undertaken for both the LRT and BRT alternatives. To minimize soil compaction, heavy construction equipment would be confined to areas of proposed development. Appropriate best management practices (BMPs) including erosion and sedimentation controls would be identified during the final design and employed during construction to limit these impacts, including:

- ~ The contractor would be required to prepare and implement a temporary erosion and sedimentation control plan.
- ~ Should any BMP or other operation not function as intended, the contractor would take additional action to minimize erosion, maintain water quality, and achieve the intended environmental performance.
- ~ The contractor would be required to take measures to preserve reasonable access to active farmlands during construction.

#### 5.1.6 Indirect Effects

Both the BRT and LRT versions of Alternative 2 and non-revenue LRT tracks for Alternative 3 would abut active farmland north of Potters Road and a small portion of the

farmland parcel east of London Bridge Road (see **Figure 5.1-1**), but access to the parcels would not be permanently restricted by either Alternative.

#### 5.1.7 Avoidance, Minimization, and Mitigation

No adverse impact to soils and farmland is anticipated, so no mitigation would be required. However, BMPs for erosion control would be incorporated into the final design following local and state regulations.

### 5.2 Surface Water, Groundwater, and Water Quality

This section presents information about the potential effects to surface water, groundwater, and water quality in the VBTES Corridor resulting from the build alternatives.

#### 5.2.1 Legal and Regulatory Context

The primary federal, state, and local regulations that govern the project’s effects on surface and groundwater resources are listed below. In addition, the Virginia Coastal Zone Management and the City’s Chesapeake Bay Preservation programs have resulted in local ordinances that set standards for private development relative to water quality. These laws and regulations are summarized below:

##### Federal

- ~ **Section 404 of the Clean Water Act (CWA) (33 USC 1251 et seq.):** Section 404 of the CWA establishes a program to regulate the discharge of dredge or fill materials into waters of the United States, including wetlands. The basic premise of Section 404 is that no discharge of dredged or fill material may be permitted (1) if a practicable alternative exists that is less damaging to aquatic resources or (2) if the nation’s waters would be significantly degraded. U.S. protected waters traditionally include navigable waters and also extend to interstate waters, territorial seas, tributaries to navigable waters, and adjacent wetlands. The U.S. Army Corps of Engineers (USACE) administers the program on a day-to-day basis, including individual permit decisions and jurisdictional determinations (JD), developing policy and guidance, and enforcing

Section 404 provisions. The U.S. Environmental Protection Agency (EPA) develops and interprets environmental criteria employed in evaluating permit applications, identifies activities that are exempt from permitting, reviews and comments on permit applications, and enforces Section 404 provisions. The EPA has the authority to veto USACE permit decisions.

- ~ **Section 401 of the CWA: Also known as the water quality certification program (33 USC 1251 et seq.):** Section 401 requires any applicant for a federal license or permit to conduct an activity that has the potential for any discharge into waters of the United States to provide the licensing or permitting agency with a certification from the state in which the discharge originates.
- ~ **The Water Quality Act (WQA) (amendments to 33 USC 1251 et seq.):** The 1987 WQA requires “... states to identify waters that do not meet water quality standards due to the discharge of toxic substances, to adopt numerical criteria for the pollutants in such waters, and to establish effluent limitations for individual discharges to such water bodies.” The act establishes the legal framework for regulating point sources that discharge to “waters of the United States” under the National Pollutant Discharge Elimination System (NPDES) program. Point sources are individual sources of discharged water such as pipes or man-made ditches from specific sites such as wastewater treatment plants. Industrial, municipal, and other facilities must obtain permits if their discharges go directly into surface waters. The NPDES permit program in the Commonwealth of Virginia is administered by the Department of Environmental Quality (DEQ).
- ~ **The 1974 Safe Drinking Water Act (SDWA) (42 USC 300f et seq.):** SDWA authorizes the EPA to set national health-based standards for drinking water to protect against both naturally-occurring and man-made contaminants. The EPA, states, and water systems then work together to make sure that these standards are met. Drinking water standards vary based on the water system size and type.

~ **Coastal Zone Management Act (CZMA) (16 USC 1451-1464):** The CZMA encourages coastal states to develop coastal zone management plans in order to control nonpoint pollution sources that affect coastal water quality. According to the CZMA, the goal of each state's coastal management program should be achieving the wise use of the land and water resources, considering ecological, cultural, historic, and aesthetic values, as well as the need for economic development. The act is administered by the National Oceanographic and Atmospheric Administration's (NOAA) Office of Ocean and Coastal Resource Management.

State

- ~ **Chesapeake Bay Preservation Act (Code of Virginia 62.1-44.15:74):** Coastal waters are managed through the 1988 Chesapeake Bay Preservation Act (the Bay Act). It requires all Tidewater Virginia municipalities to establish local programs to protect and improve water quality in the Chesapeake Bay watershed and its tributaries. Each is required to define or map its Chesapeake Bay Preservation Area and establish enforcement procedures to ensure compliance with state regulations. Each Chesapeake Bay Preservation Area is further defined locally within two subareas, a Resource Management Area (RMA) and Resource Protection Area (RPA). The Virginia Department of Environmental Quality (DEQ) reviews state projects located within the Chesapeake Bay Preservation Area for consistency with the requirements of the Bay Act and its regulations.
- ~ **Virginia Coastal Zone Management (CZM) Program (established by Executive Order):** The CZM Program for Virginia comprises a network of agencies with authority to manage activities and water quality in the state's coastal zone with the Virginia DEQ serving as the lead agency. The CZM Program's goals include protecting coastal resources, air and water quality, preventing the loss of coastal habitat and loss of life and property from coastal hazards, providing for sustainable wild fisheries and aquaculture, promoting renewable energy, and improving public access. The

CZM Program is implemented through the Virginia DEQ, the Virginia Department of Game and Inland Fisheries (DGIF), the Virginia Marine Resources Commission (MRC), and the Virginia Department of Health.

~ **The 1997 Virginia Water Quality Monitoring Information and Restoration Act (WQMIRA) (Code of Virginia 62.1-44.19:5):** This statute directs the Virginia DEQ to develop a list of impaired waters, a total maximum daily load (TMDL) of permissible pollutant levels for each impairment, and implementation plans for these TMDLs.

~ **The State Water Control Law (Code of Virginia 62.1-44.2 through 62.1-44.34:28):** The purpose of the State Water Control Law is to protect existing high quality state waters, restore other state waters to good quality in order to support public uses and aquatic life, safeguard clean waters while also preventing an increase in pollution, and reducing existing pollution.

~ **Regulations governing the Virginia State Water Control Board (Code of Virginia 62.1-44.35 through 62.1-44.44):** The State Water Control Board promulgates Virginia's water regulations, covering a variety of permits, permit fees, groundwater management areas, groundwater withdrawals, and petroleum storage tanks. Section 9VAC25-280-30 of the Virginia Code sets the anti-degradation policy for groundwater.

~ **Groundwater Management Act of 1992 (Code of Virginia 62.1-254 through 62.1-270):** Virginia manages groundwater through a program regulating withdrawals in declared Ground Water Management Areas. Presently, the state has two Ground Water Management Areas. The Eastern Virginia Ground Water Management Area comprises an area east of I-95 and south of the Mattaponi and York rivers, including the City of Virginia Beach. Any person or entity wishing to withdraw 300,000 gallons per month or more in a declared management area must obtain a permit.

Local

- ~ **City of Virginia Beach Chesapeake Bay Preservation Area Ordinance (CBPAO) (Appendix F, Virginia Beach City Code):** The City adopted its Chesapeake Bay Preservation Area Ordinance on January 1, 1991, with amendments effective in 2004. This ordinance affects all property in Virginia Beach that drains into the Chesapeake Bay Watershed. All municipalities in Tidewater Virginia, including Virginia Beach, also manage land use to avoid or minimize impacts to the CZM by requiring developers to meet water quality standards as part of site planning and construction. Any land disturbing activity greater than 2,500 square feet is required to meet performance-based water quality criteria.
- ~ **City of Virginia Beach Stormwater Management Regulations (Appendix D, Virginia Beach City Code):** The City of Virginia Beach Stormwater regulations require that a Stormwater Management Plan, including an Erosion and Sedimentation Control Plan, be submitted in order to allow the City of Virginia Beach to evaluate the environmental characteristics of the affected areas, the potential impacts, and mitigation. For development projects, the post development nonpoint source runoff cannot exceed predevelopment levels, and for redevelopment projects the nonpoint source pollution load must be reduced by at least ten percent of the existing load.

5.2.2 Methodology

Information on surface water bodies, groundwater, and existing water quality conditions was obtained primarily from the Virginia DEQ, its Chesapeake Bay Program, and the City of Virginia Beach. Data sources include geographic information system (GIS) data layers from Virginia DEQ, the Virginia Water Quality Assessment Integrated Report (March 2012), The Land and Water Quality Protection In Hampton Roads Phase I Report (Hampton Roads Planning District Commission, March 2013) and online resources through the City of Virginia Beach and Chesapeake Bay Program ([www.chesapeakebay.net](http://www.chesapeakebay.net)). The Conservation Plan for the Southern Watershed Area/Natural Heritage

Technical Report 00-12 (February 2001, Virginia DCR) was also consulted for an overview of the watershed resource protection efforts by Virginia DCR and the conservation policies in the region. The watersheds evaluated in detail within the Southern Watershed Area all reside adjacent to and south of the VBTES Corridor.

Available groundwater data were obtained from a 1981 report entitled, Groundwater Resources of the Four Cities Area, prepared by the State Water Control Board Tidewater Regional Office. More current information was also obtained from the report entitled Groundwater-Quality Data and Regional Trends in the Virginia Coastal Plain, 1906 –2007 (USGS, 2010).

The Virginia DEQ has defined water quality ratings or categories based on those developed by the EPA for water quality assessment through the CWA. The Virginia water quality assessment process identifies six primary designated uses, as appropriate for a particular waterbody, based on water quality standards. These uses are:

1. **Aquatic Life:** supports the propagation, growth, and protection of a balanced indigenous population of aquatic life which may be expected to inhabit a waterbody
2. **Recreation Use:** supports swimming, boating, and other recreational activities
3. **Fish Consumption:** supports game and marketable fish species that are safe for human health
4. **Shellfishing:** supports the propagation and marketability of shellfish
5. **Public Water Supply:** supports safe drinking water
6. **Wildlife Use:** supports the propagation, growth, and protection of associated wildlife

Each waterbody is rated based on the extent to which it supports these uses in a range from 1 (fully supporting the desired use of the waters) to 5 (water quality standard is not attained; the water is impaired or threatened for one or more designated uses). **Table 5.2-1** identifies the water quality classifications for surface waters within the VBTES Corridor and the Chesapeake Bay. The three water quality



classifications for surface waters that have been designated within the VBTES Corridor and the Chesapeake Bay are described as follows:

- ~ **Category 5A** - a water quality standard is not attained. The water is impaired or threatened for one or more designated uses (excluding shellfish use) by a pollutant (s) and requires a TMDL (303d list).
- ~ **Category 5D** - the water quality standard is not attained where TMDLs for a pollutant(s) have been developed but one or more pollutants are still causing impairment requiring additional TMDL development.
- ~ **Category 3A** - no data are available within the data window of the current assessment to determine if any designated use is attained and the water was not previously listed as impaired (Virginia DEQ Virginia Water Quality – Integrated Report, 2012)

The water quality rating (TMDL) is a set of data determining the threshold for maximum daily level of a pollutant that a water body can absorb or handle for its desired uses. The TMDL has been set for most of the Class 5 waterbodies that interface with the VBTES Corridor. For those with a TMDL under development or refinement, there is a target date for finalizing the TMDL by 2018.

In general, impacts to surface water quality can result from a wide variety of actions, including the direct dredging and/or filling of surface water resources; from land clearing, grading, and other development activities such as the addition of increased impervious surface areas within a watershed; from erosion of exposed earth surfaces resulting in sedimentation; from direct stream channel and stream bank modifications; from point and non-point source discharges; and from dewatering activities. Direct impacts to surface water resources were assessed by comparing the conceptual footprints of improvements being considered to known surface water resource locations utilizing GIS. Identified construction limits shown on conceptual engineering plans were used as the boundaries for determining if a water resource would potentially be affected by an alternative. This comparison method addresses both temporary and permanent construction impacts, such as from construction access and slope stabilization.

New areas of impervious surfaces were identified using conceptual plans for the project. Impervious surfaces do not allow infiltration of stormwater, so converting surfaces from pervious to impervious increases runoff volumes to surface waters and decreases infiltration. Paved roadways and parking lots accumulate contaminants associated with motor vehicles, such as leaked fuel, oil, brake fluid, and brake and tire dust (including lead and other metals), and other potentially toxic materials. During storms, these contaminants can be conveyed by sheet flow or drainage systems to downstream waters. Paved surfaces also retain heat, especially during the summer months, and can result in stormwater runoff with higher temperatures reaching cooler surface waters—this is referred to as a thermal impact. Runoff velocities are also affected by changes in surfaces. Impervious surfaces convey runoff faster than pervious soils and vegetated lands, which can result in increased erosion of exposed soils. Therefore, whenever a vegetated site is converted to a paved surface, adjacent receiving surface waters are potentially at risk for increased sediment loads, increased water temperatures, and increased stormwater-borne contaminant loads.

Groundwater impacts can occur when the groundwater table is exposed. Exposure of the groundwater table may occur when an excavation intercepts it. This puts the groundwater at risk for directly receiving contaminated runoff or construction-related spills that can potentially degrade the quality of groundwater.

Information on existing coastal resources was obtained primarily from the Virginia DEQ, its Chesapeake Bay Program, and the City of Virginia Beach. Data sources include GIS data layers from Virginia DEQ and City of Virginia Beach, the Virginia Water Quality Assessment Integrated Report (March 2012), the Hampton Roads Planning District Commission report, Land and Water Quality Protection In Hampton Roads, Phase I Section 309 Grant Project Final Report FY 2011 – 2012. Online resources were also consulted through the DEQ ([www.deq.virginia.gov/Programs/Water/ChesapeakeBay](http://www.deq.virginia.gov/Programs/Water/ChesapeakeBay)) and the Chesapeake Bay Program ([www.chesapeakebay.net](http://www.chesapeakebay.net)).

Direct impacts to coastal resources were considered to occur where elements of the project alternatives would interface directly with any designated Chesapeake Bay Preservation Area resources and would potentially modify any waterways or their shorelines, degrade any coastal resources, or cause a change in stormwater flows directly to any adjacent or abutting coastal waters. Indirect impacts were considered to occur where changes to stormwater flows reaching more distant off-site coastal waters could potentially impact water quality.

### 5.2.3 Existing Conditions Surface Water Quality

The VBTES Corridor falls within the Chesapeake Bay Watershed. In Virginia Beach, three secondary watersheds make up the Chesapeake Bay primary watershed: the Elizabeth River, Little Creek, and the Lynnhaven River. Of these, the Elizabeth River and Lynnhaven River watersheds encompass the VBTES Corridor. The VBTES Corridor also runs through the northern limits of the Rudee Inlet/Owls Creek Watershed, which drains to the Atlantic Ocean south of the Virginia Beach Oceanfront; however, no waterbodies within the VBTES Corridor drain to this watershed. Surface water resources in the VBTES Corridor, aside from wetlands, include estuarine bays, rivers and creeks, and ponds. Surface waters within or adjacent to the VBTES Corridor are shown in **Figure 5.2-1**.

Seven streams and their tributaries cross the alignments under consideration in the VBTES. In addition, a small freshwater pond is located at Southern Boulevard east of South Lowther Drive, and a second pond is located south of I-264 and east of London Bridge Road. Alternative 3 also crosses Upper Linkhorn Bay. These waterbodies and their Virginia DEQ water quality ratings (where available) are listed in **Table 5.2-1**. In addition to those waterbodies identified in **Table 5.2-1**, a manmade pond is located south of 19<sup>th</sup> Street near where it meets Pavilion Drive. This pond appears to serve a specific stormwater function and, as such, has not been included in the analysis that follows. As indicated within **Table 5.2-1**, five of the ten waterbodies in proximity to the VBTES Corridor are considered by Virginia DEQ to be impaired, while the remaining five were not

assessed or no data was available to determine if a designated use is attained.

### Coastal Waterways and Chesapeake Bay Preservation Area

Virginia's Coastal Zone is shown in **Figure 5.2-2**. It encompasses the Atlantic Coast watershed and portions of the Chesapeake Bay and Albemarle-Pamlico Sound watersheds. It includes 29 counties, 17 cities, and 42 incorporated towns, including the City of Virginia Beach.

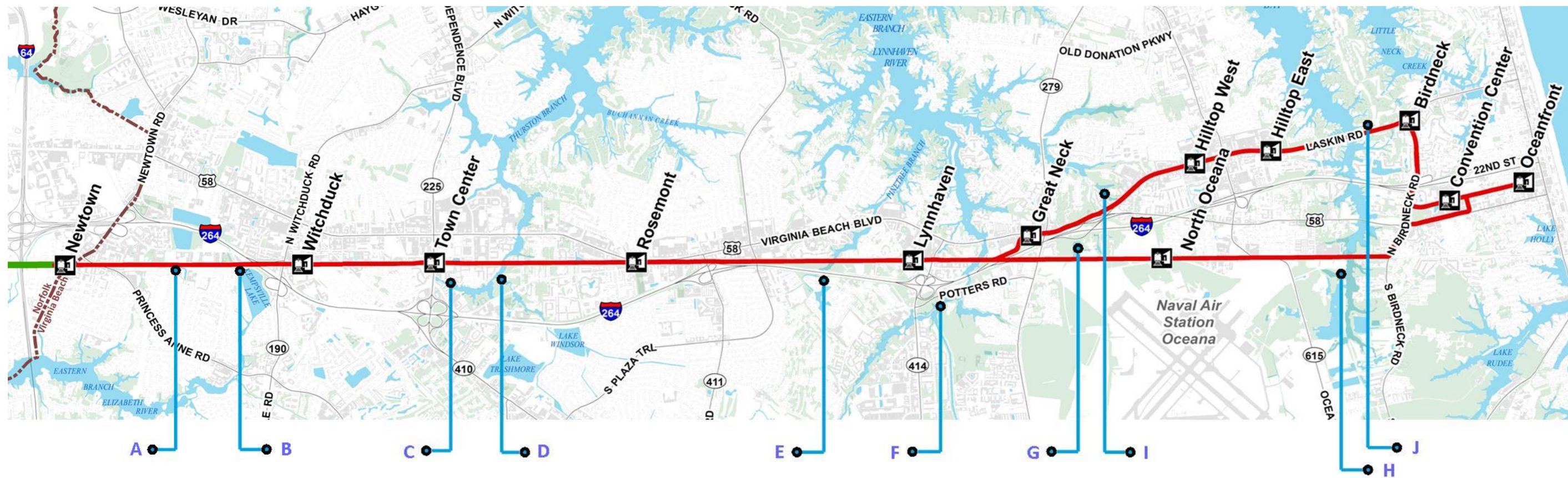
The Chesapeake Bay is the largest estuary in the contiguous United States. Its main stem is more than 195 miles long, and it has 7,000 miles of shoreline and a surface area of more than 2,200 square miles. It offers habitat to 267 fish species and 2,700 plant and animal species, and it is a major stop along the Atlantic Migratory Bird Flyway for songbirds and birds of prey (US Fish and Wildlife, Chesapeake Bay Field Office (<http://www.fws.gov/chesapeakebay/migbird.html>)). In addition, it is a commercial and recreational resource. The Chesapeake Bay receives 1.5 billion gallons of treated sewage effluent per day and waste from 3,000 point source dischargers in its upper drainage basin ([www.chesapeakebay.net](http://www.chesapeakebay.net)). It is impaired with a water quality rating of 5A.

The entire Chesapeake Bay Watershed within the City of Virginia Beach is designated as the Chesapeake Bay Preservation Area (CBPA) for the city. The VBTES Corridor falls entirely within the CBPA and thus is subject to the CBPA and Coastal Zone Management (CZM) programs. The designated City of Virginia Beach CBPA including Protection and Management subareas is shown in **Figure 5.2-3**. Resource Protection Areas (RPAs) include the following components:

- ~ tidal wetlands
- ~ nontidal wetlands
- ~ tidal shores, and
- ~ a variable width buffer area not less than 100 feet wide adjacent to and landward of these resources.

(continued on page 5-7)

Figure 5.2-1 | Surface Waters within or adjacent to the VBTES Corridor



Source: Fitzgerald & Halliday, 2014

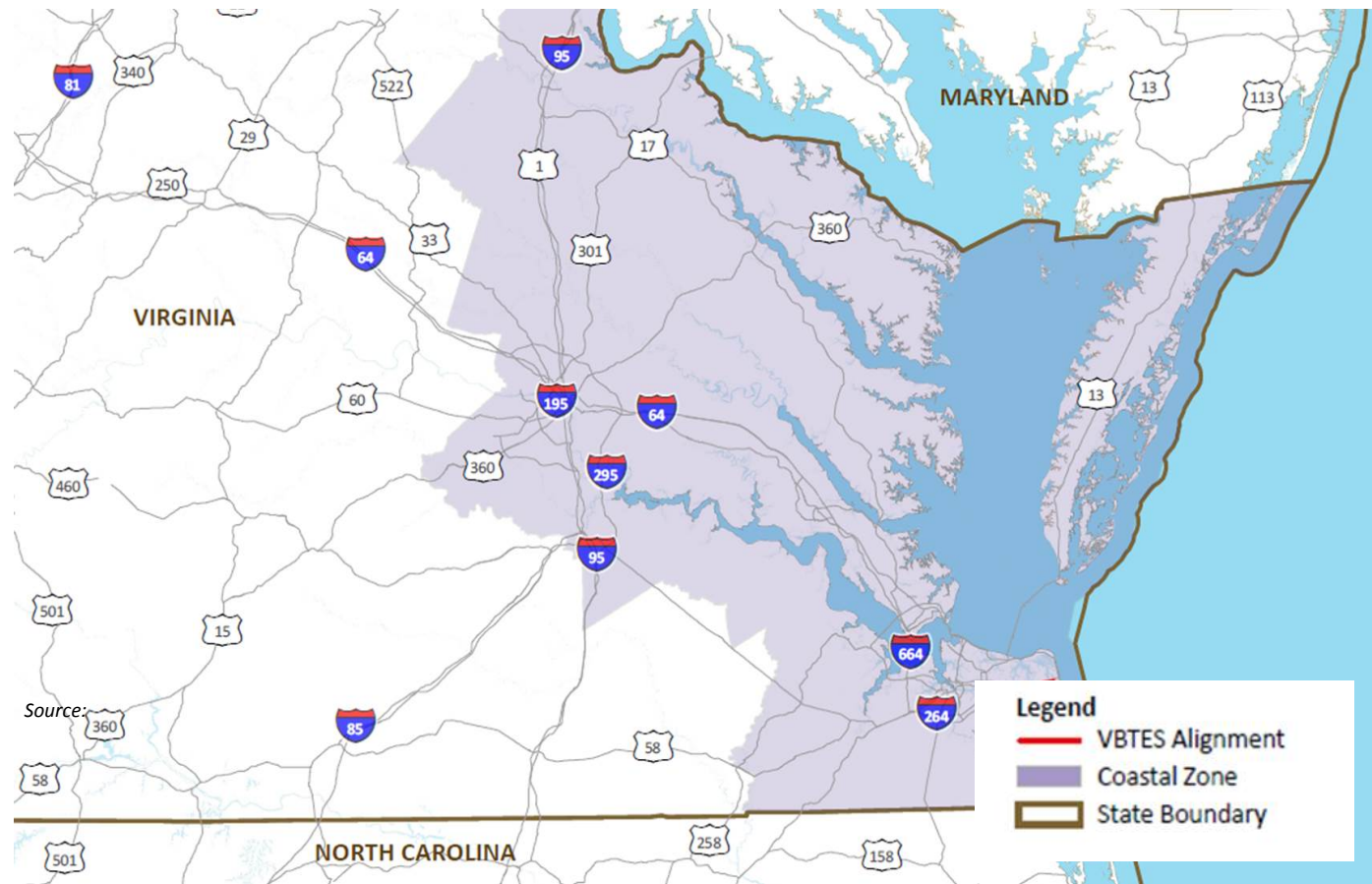
Table 5.2-1 | Surface Waters within or adjacent to the VBTES Corridor

Map Key	Waterbody Name (Type)	Approximate Location	Proximity to VBTES Corridor	Water Quality	Impaired
A	Un-named pond (small freshwater pond)	Southern Boulevard east of S. Lowther Drive	15' to the south	Not assessed	Not assessed
B	Un-named Tributary to Kempsville Lake	West of Greenwich Road	Within	Not assessed	Not Assessed
C	Tributary to Thalia Creek	West of Independence Boulevard	Within and 15' to the south	5D	Yes
D	Thalia Creek (estuarine)	Southern Boulevard West of S. Gum Avenue	Within	5D	Yes
E	Unsegmented tributary to Lynnhaven Bay; Pinetree Branch (estuarine creek)	Virginia Beach Boulevard at North Lynnhaven Road	Within	5D	Yes
F	London Bridge Creek (estuarine creek)	NSRR west of Parker Lane	Within	5D	Yes
G	Un-named pond (freshwater pond)	South of I-264 and east of London Bridge Road	Immediately adjacent	Not assessed	Not assessed
H	Great Neck Creek (estuarine creek)	Southern Boulevard east of South Sykes Avenue	Within	3A	Not assessed
I	Wolfsnare Creek (southern end of the creek)	Laskin Road at Chapel Lake Drive	Within	Not assessed	Not assessed
J	Upper Linkhorn Bay (estuarine bay)	Laskin Road at Bayway Road	Within	5D	Yes

Source: Fitzgerald & Halliday, 2014



Figure 5.2-2 | Virginia’s Coastal Zone



Source: Fitzgerald & Halliday, 2013

Resource Management Areas (RMAs) consist of all lands within the Chesapeake Bay Watershed that are not designated as RPAs.

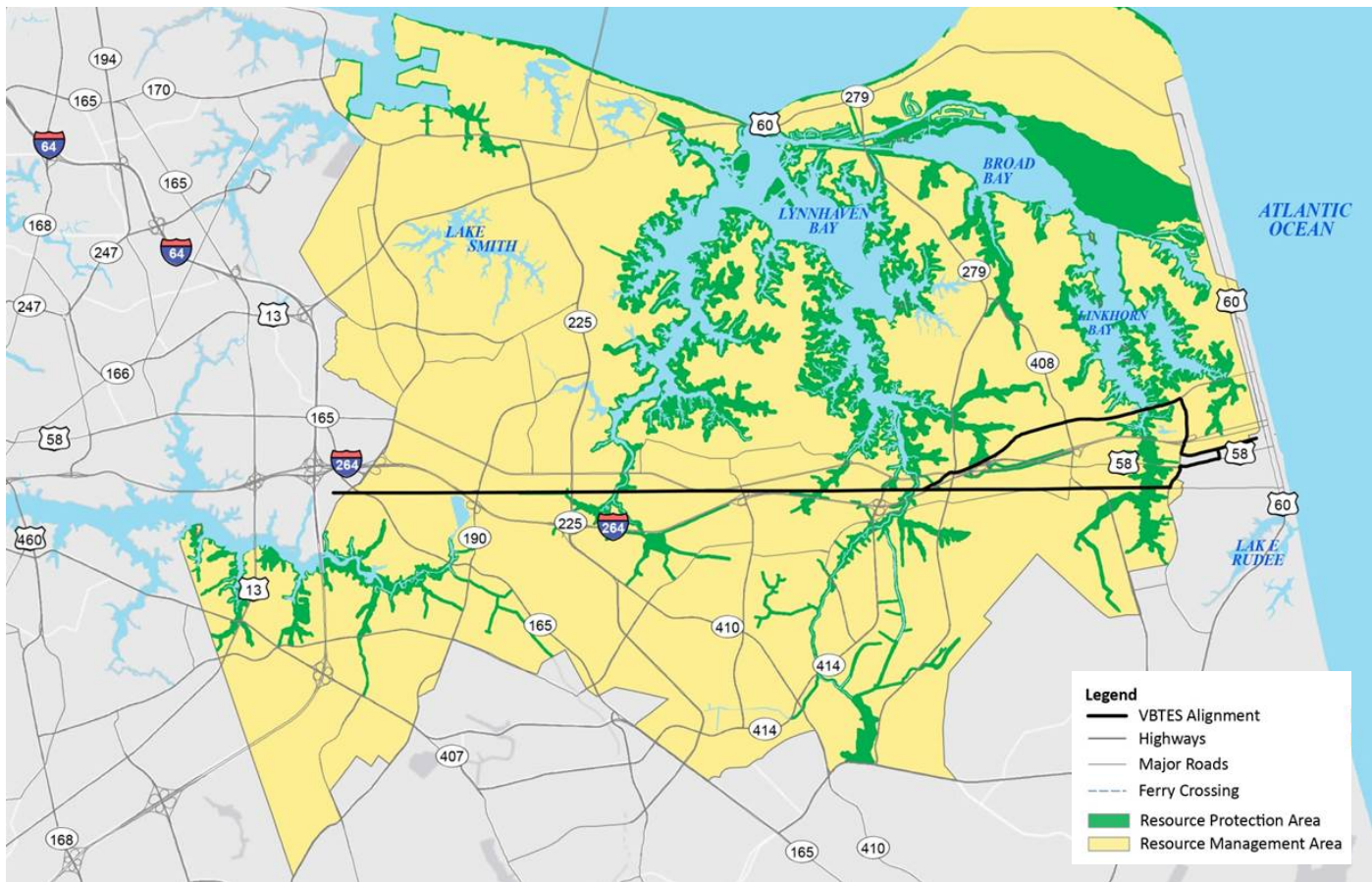
**Groundwater Quality**

The VBTES Corridor falls within the Coastal Plain in Virginia, which extends inland from the coast about 110 miles and is underlain by a series of aquifers and artesian systems. The aquifers within the Coastal Plain region are composed mostly of alternating layers of sand, gravel, shell rock, silt, and clay. Two primary groundwater systems are in the Norfolk-Virginia Beach area, one shallow (water-table aquifer) and one deep (Yorktown aquifer). The City of Virginia Beach is within the Eastern Virginia Groundwater

Management Area. The Virginia DEQ sets groundwater policies and utilizes the management areas to control withdrawals.

Based on existing documentation and field observation, the shallow groundwater table that underlies the VBTES Corridor is estimated to range in depth from just below to 15 feet below the land surface (City of Virginia Beach Comprehensive Plan, 2009). The surface topography suggests that groundwater flow within the eastern and central portions of the VBTES Corridor will generally be in a northerly direction towards the Lynnhaven River. Groundwater flow within the western portion of the VBTES Corridor appears to be in a southwesterly direction towards the Elizabeth River. This is an assumption based on the fact

Figure 5.2-3 | Chesapeake Bay Preservation Area



Source: Fitzgerald & Halliday, 2013

that groundwater flows tend to mimic trends in surface topography. No groundwater flow direction measurements or confirmations have been taken for this DEIS.

The water table strata are discontinuous and are formed of unconsolidated sand, silt, and combination gravel/sand zones. In many places, this shallow unconfined groundwater-table aquifer system lies above relatively impermeable clay beds. The quality of groundwater in the shallower water-table aquifers is highly variable as a result of short flow paths between closely located recharge and discharge areas and due to the proximity of human discharge sources (Virginia DEQ Water Quality Assessment, 2012).

As part of the VBTES project, a Phase II Environmental Site Assessment was conducted for the portion of the alignment between Newtown Road Station and Birdneck Road along the former NSRR ROW. As part of the study, 33 soil and groundwater samples were taken. The study found no issues related to petroleum, solvent, or pesticide contamination in areas where the groundwater was sampled.

The majority of City of Virginia Beach public drinking-water supply is obtained from surface reservoirs located outside the city limits, most notably the Lake Gaston reservoir in Brunswick County, Virginia. The Virginia Beach public water system serves the northern suburban and urban portions of the city, including the VBTES Corridor. According to the City

of Virginia Beach Department of Public Utilities, some wells may exist within the VBTES Corridor, although it is likely that the majority of them are used for irrigation and not for drinking water (Virginia Beach DPW, 2013).

### 5.2.4 Environmental Impacts

#### No Build Alternative

Under the No Build alternative, the VBTES project would not be undertaken. Surface water resources along Laskin Road could potentially be affected by the planned roadway widening, primarily from increased sediment loads both during and after construction. However, these effects would likely be minimal, as the project would be required to comply with applicable laws regarding water quality and would employ erosion and sedimentation controls and other water quality BMPs to avoid and minimize impacts to the greatest extent possible. The widening of Laskin Road is a planned project by the Virginia Department of Transportation (VDOT) that would occur regardless of the VBTES project.

#### Build Alternatives

All of the build alternatives and the VSMF could increase levels of some contaminants within the affected watersheds. These increases are expected to be minimized with the use of sediment and erosion-control measures during construction and implementation of a Stormwater Management Plan, as required by the City of Virginia Beach's Stormwater Management Ordinance.

Potential impacts during construction of the build alternatives include physical disturbances of streams and stormwater ditches, accidental spills of harmful materials, and erosion of sediment from disturbed areas. Impacts associated with the build alternatives and the vehicle storage and maintenance facility following construction are primarily based on the potential for contamination of surface waters by runoff from new impervious surfaces. Increased impervious surfaces and vehicle use (either BRT or vehicle concentrations at the Park & Ride facilities) can increase the concentrations of contaminants in nearby surface waters. Increased impervious surfaces also increase the volume and rate of stormwater runoff and limit groundwater recharge.

During construction, the potential for water quality impacts would be minimized through the use of BMPs as described in the current edition of the Virginia Stormwater Management Practices Handbook or as described in the City of Virginia Beach Stormwater Management Ordinance.

A Stormwater Management Plan would be designed and approved in compliance with City requirements to treat both quantity and quality of stormwater runoff prior to discharge into receiving waters. The City's Stormwater Management Ordinance, contained in Appendix D of the City Code, requires that runoff from the site after development "... approximates the rate of flow and timing of runoff that would have occurred following the same rainfall under existing conditions and, to the extent practicable, predevelopment conditions, unless runoff is discharged into an off-site stormwater management facility...." Therefore, no adverse effects from increased stormwater are anticipated.

#### LRT Build Alternatives

##### ALTERNATIVE 1A: Town Center Alternative

Alternative 1A would be constructed within a developed urban area with extensive areas or zones of existing impervious surfaces. The alternative would include the construction of new track, maintenance road, traction power substations, a drainage system, and two stations along the former NSRR ROW. Surface water bodies within this segment that could potentially be impacted by the VBTES project include a small freshwater pond, an unnamed tributary to Kempsville Lake, and a tributary to Thalia Creek.

Although the LRT would be ballasted track construction, the compacted subballast layer underneath the track would render the surface impervious. As such, there would be an increase in stormwater flow and a reduction in direct on-site groundwater infiltration. However, as part of Alternative 1A, a new drainage system would be constructed to convey stormwater off-site and away from the track bed by the new man-made trackside drainage channels. The drainage channels are expected to be an improvement over the existing system of ditches, which are

in varied states of maintenance and repair. Furthermore, any increase in stormwater flow resulting from the design of the track system would be offset by the implementation of stormwater BMPs.

In addition to the track itself, there could be changes to the impervious cover at the station sites and for the associated Park & Ride surface parking lots. For Alternative 1A this includes the Witchduck Station and the Town Center Station. Increases to the amount of impervious areas would result in greater stormwater runoff volumes and reductions in groundwater recharge. The exact amount of impervious cover would be determined as the station designs progress. At the Witchduck and Town Center Stations, there is the potential for an increase in impervious surfaces due to the proposed surface parking; however, a large proportion of the parcels identified for the Park & Ride lots have already been developed.

Changes to the amount of impervious area on a site would affect the quantity of stormwater runoff and groundwater recharge. Oils and other fluids leaking or dripping from parked cars onto paved Park & Ride lots at stations would be transported in stormwater runoff and could potentially degrade receiving waters. Left untreated, the increased stormwater flow has the potential to affect water quality within two unnamed waterbodies and a tributary to Thalia Creek, as well as the Lynnhaven River and Chesapeake Bay. BMPs would be employed to diminish the flows resulting from the increase in impervious surface area as well as provide treatment to improve water quality prior to ultimate discharge to receiving waters. As previously indicated, existing regulations require that a Stormwater Management Plan, including an Erosion and Sedimentation Control Plan, be submitted to the City of Virginia Beach prior to any development approval. The City's design specifications for development within RPAs would be followed, ensuring that the design meets the City's requirements for stormwater control and water quality. As such, adverse impacts to water quality are not anticipated from this project alternative.

##### ALTERNATIVE 1B: Rosemont Alternative

Alternative 1B would have the same type of impacts as Alternative 1A. The Alternative 1B alignment would include construction of a new track, maintenance road, traction power substations, drainage system, and three stations each with Park & Ride surface lots along the former NSRR ROW from the Newtown Road Station to Rosemont Station. New stations would include the Witchduck Station, the Town Center Station, and the Rosemont Station. As with the Witchduck and Town Center Stations, there is the potential for an increase in impervious surfaces due to the proposed surface parking at the Rosemont Station; however, unlike the other Park & Rides, a large proportion of the parcels identified for the Park & Ride lot at the Rosemont Station are not already developed.

Changes to the amount of impervious area on a site would affect the quantity of stormwater runoff and groundwater recharge. Oils and other fluids leaking or dripping from parked cars onto paved Park & Ride lots at stations would be transported in stormwater runoff and could potentially degrade receiving waters. Left untreated, the increased stormwater flow has the potential to affect water quality within two unnamed waterbodies, Thalia Creek and its tributary, as well as the Lynnhaven River and Chesapeake Bay. However, BMPs would be employed to diminish the flows resulting from the increase in impervious surface area as well as provide treatment to improve water quality prior to ultimate discharge to receiving waters. As previously indicated, existing regulations require that a Stormwater Management Plan, including an Erosion and Sedimentation Control Plan, be submitted to the City of Virginia Beach prior to any development approval. The City's design specifications for development within RPAs would be followed, ensuring that the design meets the City's requirements for stormwater control and water quality. Thus, adverse impacts to water quality resulting from increased impervious surfaces and stormwater flow are not anticipated under Alternative 1B.

In addition to the impacts noted above, the existing railroad bridge over Thalia Creek would be replaced. Fill material would be removed along the banks of the creek, thereby widening the crossing to improve stream flow and mitigate

localized flooding conditions in the area. If creosote railroad ties are used in the construction of the new bridge, there is the potential for the railroad ties to contribute to the cumulative concentrations of environmentally ubiquitous Polycyclic Aromatic Hydrocarbon (PAH) compounds often found in environmental media. Many of these compounds are associated with water quality impacts. Creosote infused within wood products has the potential to exude out of the ties under certain environmental conditions. As the project's design progresses, alternative materials and methods that can be used to construct these crossings will be evaluated to minimize or mitigate potential impacts.

#### ALTERNATIVE 2: NSRR Alternative

The Alternative 2 alignment would include construction of a new track, maintenance road, traction power substations, drainage system, and five stations each with Park & Ride surface lots along the former NSRR ROW from the Newtown Road Station to Birdneck Road. Two stations without Park & Ride lots would be constructed east of Birdneck Road, at the Convention Center, and Oceanfront.

From Newtown Road to Rosemont, the change in impervious surfaces from the project would be as described for Alternatives 1A and 1B. From the Rosemont Station to the Oceanfront Station, the track and drainage system, as well as the associated impacts, would be similar to those described for Alternative 1A and 1B for that portion running on the former NSRR ROW with the addition of the Lynnhaven and Oceana Stations and Park & Ride lots. The NSRR corridor ends at Birdneck Road, and the LRT guideway would run in the median of Birdneck Road and 19<sup>th</sup> Street and adjacent to 17<sup>th</sup> Street.

The potential for water quality impacts at the station sites between Newtown Road and Rosemont would be the same as those discussed under Alternatives 1A and 1B. At the Lynnhaven Station, there is the potential for an increase in impervious surfaces due to the proposed surface parking; however, a large proportion of the parcels identified for the Park & Ride lot have already been developed. It is expected that a paved parking area would also need to be developed for the North Oceana Station. Parking for the Convention Center Station would use existing parking lots. There would be no dedicated parking for the Oceanfront Station, but the

City of Virginia Beach is planning to construct a parking garage north of the station as part of a separate project.

As previously discussed, changes to the amount of impervious area on a site would affect the quantity of stormwater runoff and groundwater recharge. Oils and other fluids leaking or dripping from parked cars onto paved Park & Ride lots at stations would be transported in stormwater runoff and could potentially degrade receiving waters. Left untreated, the increased stormwater flow has the potential to affect water quality within Thalia Creek and its tributary, three unnamed waterbodies, the Pinetree Branch, London Bridge Creek, and Great Neck Creek, as well as the Lynnhaven River and the Chesapeake Bay. BMPs would be employed to effectively treat and improve stormwater quality and diminish discharge flows into receiving waters. As previously indicated, existing regulations require that a Stormwater Management Plan, including an Erosion and Sedimentation Control Plan, be submitted to the City of Virginia Beach and the City's design specifications for development within RPAs would be followed, ensuring that the design meets the City's requirements for stormwater control and water quality. As such, adverse impacts to water quality resulting from the increase in impervious surface and stormwater flow are not anticipated.

Under Alternative 2, the bridges over Thalia Creek and London Bridge Creek would be replaced, and fill material at the bridge approaches would be removed from the banks of both creeks, thereby widening the crossings and potentially improving stream flow in the vicinity of the bridges. If creosote railroad ties are used in the construction of the new bridges, there is the potential for the railroad ties to contribute to the cumulative concentrations of environmentally ubiquitous Polycyclic Aromatic Hydrocarbon (PAH) compounds often found in environmental media. Many of these compounds are associated with water quality impacts. Creosote infused within wood products has the potential to exude out of the ties under certain environmental conditions. As the project's design progresses, alternative materials and methods that can be used to construct these crossings will be evaluated to minimize or mitigate potential impacts.

#### ALTERNATIVE 3: Hilltop Alternative

Alternative 3 would include construction of a new track, maintenance road, traction power substations, drainage system, and ten new stations along the former NSRR ROW, Virginia Beach Boulevard, Laskin Road, Birdneck Road, and 19<sup>th</sup> Street between the Newtown Road Station and the Oceanfront Resort Area. From the Newtown Road Station to east of London Bridge Creek, the LRT tracks would run along the former NSRR ROW. In this area, the track and drainage system, as well as the associated water quality implications, would be similar to those described for Alternatives 1A, 1B, and 2. However, along Laskin Road, Birdneck Road, and 19<sup>th</sup> Street, the LRT tracks would be primarily in the median of the roadway, portions of which are already paved.

The potential for water quality impacts at the station sites between Newtown Road and Lynnhaven would be the same as those previously discussed for Alternatives 1A, 1B, and 2. A new Park & Ride lot is planned at the Great Neck Station; however, the proposed site is currently developed with a majority of the area as impervious surface. No new parking is proposed for the area near the Hilltop West Station. The parking areas proposed for the Hilltop East Station and the Birdneck Station would likely increase the amount of impervious surface area on their respective sites. The Convention Center Station for Alternative 3, as described in Chapter 2, would use existing parking areas at the Convention Center. The Oceanfront Station would be the same as described for Alternative 2.

Because of the potential for increased stormwater runoff associated with the new parking lots, there is the potential to affect water quality within Thalia Creek and its tributary, two unnamed waterbodies, the Pinetree Branch, London Bridge Creek, Wolfsnare Creek, and Upper Linkhorn Bay, as well as the Lynnhaven River and the Chesapeake Bay. In addition, an un-named pond lies north of the lead track to the vehicle storage and maintenance facility. As with Alternatives 1A, 1B, and 2, BMPs would be employed to effectively treat and improve stormwater quality and diminish flows prior to ultimate discharge to receiving waters. The stormwater management plan for the project and individual station sites would include BMPs, and it would be approved by the City of Virginia Beach in accordance with state and City regulations. Therefore,

adverse impacts to water quality resulting from increased impervious surfaces and stormwater flow are not anticipated from this project alternative.

As under Alternative 2, the bridges over Thalia Creek and London Bridge Creek would be replaced. In addition, under Alternative 3 the bridge over Upper Linkhorn Bay would also be replaced. If creosote railroad ties are used in the construction of the new bridges, there is the potential for the railroad ties to contribute to the cumulative concentrations of environmentally ubiquitous Polycyclic Aromatic Hydrocarbon (PAH) compounds often found in environmental media. Many of these compounds are associated with water quality impacts. Creosote infused within wood products has the potential to exude out of the ties under certain environmental conditions. As the project's design progresses, alternative materials and methods that can be used to construct these crossings will be evaluated to minimize or mitigate potential impacts.

#### LRT VSMF

The LRT vehicle storage and maintenance facility (VSMF), which would be constructed under Alternatives 2 or 3, is proposed to be located on property owned by the City of Virginia Beach between Potters Road and I- 264, north of NAS Oceana. Hazardous materials, such as cleaning compounds, solvents, and petroleum products, may be employed on the site as part of the vehicle maintenance function. However, these substances would be handled in accordance with applicable regulations, thus any effects to water quality are anticipated to be negligible. Although the facility would result in an increase in impervious surfaces, the facility would be designed with stormwater management basins and BMPs to minimize long-term effects to stormwater quantity and quality.

#### BRT Build Alternatives

The potential for water quality effects associated with the BRT alternatives would be nearly identical to the LRT alternatives discussed above. Specifically, the effects of the BRT Alternative 1A would be substantially similar to LRT Alternative 1A, BRT Alternative 1B would be substantially similar to LRT Alternative 1B, and the BRT Alternative 2 would be substantially similar to LRT Alternative 2. The BRT

Alternative 3 would be substantially similar to LRT Alternative 3, except that the BRT alternative would not include a lead track to the VSMF. As such, there is no potential to affect water quality within the un-named pond located south of I-264 and east of London Bridge Road. In addition, the BRT alternatives would not require a maintenance road or traction power substations. The BRT VSMF located on the same Potters Road site as the proposed LRT VSMF would not affect any surface waterbodies; however, there would be an increase in impervious surfaces resulting from the construction of the facility. Any effects would be avoided and minimized in the same manner as the LRT VSMF, incorporating stormwater management features as part of the site design in accordance with state and City regulations.

### 5.2.5 Construction Impacts

There would be increased amounts of stormwater runoff during construction. Construction activities associated with the build alternatives have the potential to affect stormwater runoff quality by increasing erosion, turbidity, and sediment transport, particularly of fine-grained sediments where excavation or demolition activities have disturbed the existing ground cover and exposed materials to erosion. An Erosion and Sedimentation Control Plan identifying locations of silt fences, inlet protection, and other control devices would be prepared prior to initiating construction. This plan would comply with all federal, state, and local regulations regarding water quality. Sedimentation basins and other BMPs provided during construction would help prevent downstream flooding, erosion, and sedimentation. A detailed engineering review would be made during final design to identify the capacity of the adjacent stormwater conveyance system and receiving waterbodies to ensure that they have sufficient capacity to convey the additional runoff without increasing the flood risk.

Impacts could also occur to surface water and groundwater quality from construction-related spills of oils, gasoline, other vehicle fluids, and other hazardous substances. However, these substances would be handled in accordance with all applicable regulations. In addition, BMPs would be

employed to guard against those releases, including such techniques as designated equipment fueling areas that are bermed and construction materials stockpile areas that include a containment and treatment system for stormwater runoff. A Stormwater Pollution Prevention Plan (SWPPP) would be developed to identify the materials and measures that would be taken to avoid and reduce the effects of spills and polluted stormwater runoff.

The planned improvements are expected to intercept the existing groundwater table, which is at a relatively shallow depth below the ground surface throughout most of the VBTES Corridor. Because the water table is so close to the surface, excavations associated with the drainage ditches, BRT or LRT guideway, maintenance road, traction power substations, and station area improvements may penetrate the groundwater strata in places and may require dewatering. If dewatering is required, water quality could potentially be affected by the uncontrolled discharge of dewatering wastewaters. To prevent adverse effects on water quality of the receiving surface waters, any water captured during the dewatering process would be pumped to a settling basin, treated, or filtered prior to discharge to receiving waters. For large areas of construction, the use of sedimentation basins to treat the dewatered waters may be employed. In addition, an engineering analysis would be conducted during final design to locate individual wells and determine if protection measures are needed. However, groundwater within the VBTES Corridor is generally not used for potable drinking water. City drinking water is piped in from Lake Gaston and other sources west of Virginia Beach.

### 5.2.6 Indirect Effects

Development and redevelopment activities around station areas would likely involve temporary soil disturbance, increases in impervious surfaces, and the use or disturbance of hazardous materials during construction which could indirectly affect water resources. These activities, however, would be subject to current water quality regulations, thus adverse impacts are not anticipated.

### 5.2.7 Avoidance, Minimization, and Mitigation

The project's drainage design, including vegetated trackside ditches, pipes, catch basins, and culverts, as well as station stormwater management systems, would be engineered to avoid and minimize adverse water quality impacts due to increased runoff volumes, contaminant loads, temperatures, and velocities to the greatest extent practicable. Collectively, the improvements would comprise an improved and enhanced drainage system compared to that which is currently in place along the existing abandoned NSRR corridor. The types of drainage improvements would vary and would depend on the design of existing adjacent drainage systems to which the new system elements would connect. Potential improvements could include the installation of deep-sump catch basins, the installation of vegetated water quality swales or ditches, the installation of new detention/retention basins or modifications to an existing basin, improved discharge erosion control measures, the use of pervious overflow parking areas, and the installation of buffer strips or infiltration strips. The design would meet the criteria for BMPs as detailed in the Virginia Stormwater Management Handbook (Virginia Department of Conservation and Recreation, 1999). The design would also be developed in consultation with the City of Virginia Beach and DEQ during the permitting process.

Construction period impacts would be avoided through the use of BMPs and in accordance with methodologies detailed in the Virginia Stormwater Management Handbook. A SWPPP would be prepared and implemented on all active construction sites at all times under each alternative.

All construction work would also adhere to the performance standards and criteria established in the City of Virginia Beach under its Chesapeake Bay Preservation Area Ordinance. The ordinance gives standards that address land disturbance, erosion and sedimentation control, stormwater management, preservation of habitat and vegetation, and other resources. Impacts within designated RMAs or RPAs would be coordinated with the City of

Virginia Beach. On-site ground surveys of the RPAs would be conducted for the rail and roadway water or wetland crossings and station sites associated with the locally preferred alternative to determine the exact location of the RMAs/RPAs relative to them. Based on the survey and detailed design information, a Water Quality Impact Assessment, consistent with the City's Chesapeake Bay Preservation Area Ordinance, would be conducted at the permitting stage of the project to determine necessary BMPs and to maintain or improve the quality of site runoff.

Additional construction practices would be employed to minimize the short-term effects of hazardous substances on

ground and surface waters during construction. These may include the following:

- ~ Off-site servicing of machinery;
- ~ Refueling of vehicles or machinery on an impervious pad with secondary containment designed to contain fuels;
- ~ Off-site storage of fuel and other hazardous materials;
- ~ Fuels or other hazardous materials that must be kept on site during working hours would be stored on impervious surfaces utilizing secondary containment;
- ~ Maintenance of a fuel spill remediation kit on site; and
- ~ Identification of the responsible party for the maintenance, inspection, repair, replacement and incorporation of new controls as may become necessary.

### 5.2.8 Permitting

Permits anticipated to be required that pertain to water quality are listed in **Table 5.2-2**.



Table 5.2-2 | Water Resource Agencies and Corresponding Permits

Permitting Agency	Regulatory Responsibility	Permit/Action
USACE	Clean Water Act	Section 404 Permit
State Water Control Board	Section 401 of Clean Water Act	Section 401 Permit
Virginia DEQ	State Water Control Law	VWP General Permit for linear transportation projects
City of Virginia Beach	Virginia Erosion and Sediment Control Law and Regulations	Plan approvals for Erosion and Sediment Control and Stormwater Management
City of Virginia Beach	Chesapeake Bay Preservation Act	Permitting standards for water quality management during construction

Source: Fitzgerald & Halliday, 2013

5.3 Wetlands

This section discusses the existing wetlands that were observed within the VBTES Corridor and potential effects that may occur as a result of the build alternatives. Additional information on wetlands is included in the Wetlands Field Investigation Report, **Appendix M** of this DEIS.

5.3.1 Legal and Regulatory Context

The following federal, state, and local regulations pertain to work in and near wetland resources.

Federal Regulations

~ **Federal Water Pollution Control Act (Clean Water Act) and Section 404 Wetlands Permit (33 U.S.C. 1251 et seq.):** The Army Corps of Engineers (USACE) is the federal agency that regulates wetlands under the Clean Water Act (CWA) of 1972. Wetlands are defined in the 1987 USACE Wetland Delineation Manual (TR-Y-87-1) based on the presence of hydrophytic vegetation, hydric soils, and wetland hydrology. The USACE regulates wetlands associated with hydrologic features connected to interstate waters (e.g., connected to streams that ultimately drain to the Chesapeake Bay). There is no wetland buffer regulated

under federal jurisdiction. The USACE has jurisdiction under the CWA to regulate the discharge of dredged or fill material into all waters of the United States including open water, inland wetlands and tidal wetlands. In order to ensure consistency with state wetland and water quality requirements, the issuance of a federal Section 404 wetland permit by the USACE would be conditional upon issuance of a State Water Quality Certification in accordance with Section 401 of the CWA. All of the build alternatives under consideration for this project would require some degree of wetland encroachment. Therefore, a Section 404 permit would be required.

~ **USACE Jurisdictional Determination:** A Jurisdictional Determination (JD) is a formal letter that is obtained from the USACE stating that they agree with the accuracy of the field delineated wetland boundary and indicating whether they regulate a wetland. A JD expires after five years; however, if the USACE is contacted prior to the expiration date, the JD may be extended for another five years. A JD from the USACE identifying federally regulated wetlands would be needed in future stages of the project when the proposed activities are better known, and environmental permits are sought for project construction.

~ **Section 10 of Rivers and Harbors Act of 1899 (33 U.S.C. 403):** The USACE also has jurisdiction under Section 10 of the Rivers and Harbors Act of 1899 regarding work performed in navigable waters of the US; if any waters within the project area are considered to be navigable by the USACE under the definitions of the Rivers and Harbors Act, USACE Section 10 jurisdiction would apply to this project. If so, since a Section 404 wetlands permit is required for this project, any Section 10 permit requirements would be combined with the Section 404 permit procedures. See **Section 5.6** for additional discussion on navigable waters.

~ **Coast Guard Bridge Permit:** The US Coast Guard, delegated by the US Secretary of Transportation, has the authority to issue permits for projects which involve the construction or modification of bridges over navigable waters of the United States under Section 9 of the Rivers and Harbors Act of 1899 (33 U.S.C. 403), the Bridge Act of 1906 (33 U.S.C. 491), and the General Bridge Act of 1946 (33 U.S.C. 525-533), as amended. Navigable waters are defined as waters which are subject to tidal influence (waters below mean high water) or waters which are not subject to tidal influence but are, have been or could be used as highways for substantial interstate or foreign commerce, notwithstanding obstructions that require portage.

~ **Executive Orders:** Executive Order 11990 mandates that federal agencies ensure preservation and enhancement of wetland resources and take appropriate action to minimize destruction, loss or degradation of wetlands in performance of their duties and administration of their programs. Executive Order 11990 is applicable to all of the build alternatives under consideration.

State of Virginia Regulations

The VA DEQ regulates activities in state waters and wetlands under Section 401 of the Clean Water Act (33 U.S.C. 1341) and under the State Water Control Law (Code of Virginia 62.1-44.2 through 44.34:28). These are discussed in detail in **Section 5.2**. Virginia Administrative Code

Regulations 9VAC25-210 et seq., 9VAC25-660 et seq., 9VAC25-670 et seq., 9VAC25-680 et seq., and 9VAC25-690 et seq. apply to the Virginia Water Protection Permit Program.

The DEQ defines wetlands using a definition similar to the USACE, and all wetlands that are regulated by the USACE would also be regulated by the DEQ. The DEQ does regulate some isolated or hydrologically unconnected wetlands; however, they do exclude from regulation certain small, hydrologically isolated wetlands. These excluded wetlands are defined as:

Isolated wetlands of minimal ecological value which means those wetlands that: (i) do not have a surface water connection to other state waters; (ii) are less than one-tenth of an acre (0.10 acre or 4,356 square feet) in size; (iii) are not located in a Federal Emergency Management Agency designated 100-year floodplain; (iv) are not identified by the Virginia Natural Heritage Program as a rare or state significant natural community; (v) are not forested; and (vi) do not contain listed federal or state threatened or endangered species.

City of Virginia Beach Regulations

The City of Virginia Beach regulates wetlands as defined in Article 14 (Wetlands Zoning Ordinance) of the City’s Zoning Ordinance (City Code Appendix A). Vegetated wetlands are defined in the Wetlands Zoning Ordinance as lands lying between and contiguous to mean low water (MLW) and an elevation above mean low water equal to the factor one and one-half (1½) times the mean tide range upon which is growing tidal marsh vegetation.

The City’s Wetlands Board is responsible for reviewing requests for permits for the use, alteration, or development of wetlands, coastal primary sand dunes, and beaches. The Board’s jurisdiction for non-vegetated wetlands lies between mean low water and mean high water (MHW), and for vegetated wetlands, from mean low water to an elevation one and one-half times the mean tide range.

### 5.3.2 Methodology

Field investigation of the wetlands in the VBTES Corridor was conducted in 2009 and 2013. The field investigation was supplemented by aerial photo interpretation. The investigation of freshwater wetlands in 2009 was conducted according to the Interim Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (USACE, October 2008). Use of this manual became mandatory in January 2009 for all wetland delineations conducted in the District of Columbia as well as the 19 states (including Virginia) that comprise the Atlantic and Gulf Coastal Plain region. The interim regional supplement was finalized in 2010. The 2013 field work was conducted in accordance with Regional Supplement to the Corps of Engineers Wetland Delineation Manual: Atlantic and Gulf Coastal Plain Region (Version 2.0) (USACE, November 2010). This approach requires that hydric soils, hydrology, and wetland vegetation be present in order for an area to be classified as a federally regulated wetland. Tidal wetland investigation was conducted based on the estimated elevation of the high tide line and extent of tidal wetland vegetation in accordance with USACE requirements. As the design is progressed in the permitting stage, City of Virginia Beach jurisdictional areas, based on MLW and MHW elevations, would be determined.

Field investigation of wetlands in the VBTES Corridor was initially conducted during the weeks of September 7-11 and November 2-6, 2009, and focused solely on an alternative alignment along the former NSRR ROW. In 2013, an alternative alignment to the Oceanfront Resort Area through the Hilltop Area and locations for the LRT/BRT VSMF were added to the project. Field work was undertaken to identify wetland areas along these new alternative alignments, as well as to verify the boundaries and characteristics of wetlands that were investigated in 2009. Where appropriate, identified wetland boundaries were adjusted based on the 2013 conditions. The 2013 field work was conducted on April 15-19 and September 9-11.

Wetland function and values were assessed according to the guidance set forth in the Wetlands Functions and Values: Descriptive Approach described in the September 1999 (NAEEP-360-1-30a) supplement to The Highway

Methodology Workbook (Supplement) by the New England Division of the USACE. Field sketches of the wetland boundaries were also developed during the wetlands field investigation.

Wetland boundaries were mapped using a Global Positioning System (GPS) unit with sub-meter accuracy. During the field investigation, each wetland was given a unique numeric or alphanumeric label. Some of the individually identified wetland areas are contiguous and form larger wetland systems, such as the wetlands located along the banks of Thalia Creek, London Bridge Creek, Great Neck Creek, and Upper Linkhorn Bay. Some wetlands may also extend beyond the immediate VBTES Corridor; however, the wetland field investigation and mapping shows only that portion of the wetland within the LOD. A formal USACE Jurisdictional Delineation (JD) was not requested for this DEIS. During the FEIS, when a locally preferred alternative has been selected and the project design has been advanced, an updated wetland delineation would be performed and a JD would be obtained. Wetland boundaries may change based on the updated delineation and JD.

### 5.3.3 Existing Conditions

Both freshwater (Palustrine) and tidal (Estuarine) wetlands are present within the VBTES Corridor. As defined by the wetland classification system developed by the U.S. Fish and Wildlife Service (USFWS) (Cowardin et. al., 1979), palustrine wetland systems include all non-tidal wetlands dominated by trees, shrubs, emergents, mosses, and/or lichens, as well as open water areas which do not qualify as lacustrine wetlands. The freshwater wetlands that occur throughout the VBTES Corridor are typically located in undeveloped areas at a lower elevation than the existing rail line or city streets. Because of the low elevation of Virginia Beach in general, slight elevation changes in the landscape often result in the occurrence of wetlands where groundwater is at or close to the soil surface. The freshwater wetland vegetation classifications (Cowardin et. al., 1979) found in the VBTES Corridor includes Palustrine Emergent (PEM), Palustrine Scrub-Shrub (PSS), and Palustrine Forested (PFO) wetlands. The PEM cover type is characterized by erect, rooted, herbaceous hydrophytes, excluding mosses and lichens. The PSS wetland cover type includes areas that are dominated by saplings and shrubs that typically form a low

and compact structure less than 20 feet tall. The PFO wetland cover types are dominated by trees and shrubs over 20 feet in height that have developed a tolerance to a seasonal high water table. Forested wetlands typically have a mature tree canopy which can have a broad range of understory and groundcover community components. Some of the wetlands in the VBTES Corridor may contain more than one cover type.

Tidal (estuarine) wetland systems include deepwater tidal habitats and adjacent tidal wetlands with low energy and salinity greater than 0.5 parts per thousand (ppt) (Cowardin et. al., 1979). Tidal wetlands in the VBTES Corridor were classified as Estuarine Emergent (E2EM). The unvegetated, deeper creek tidal areas were classified as Estuarine, Intertidal, Unconsolidated Bottom (E1UBL). The tidal wetlands in the VBTES Corridor occur in association with two tidal creeks crossed by the former NSRR ROW: Thalia Creek and London Bridge Creek. Thalia Creek is located east of Independence Boulevard, and London Bridge Creek is located east of Lynnhaven Parkway. Tidal wetlands also occur in the vicinity of the Laskin Road crossing of Upper Linkhorn Bay.

To reflect the function and ecological integrity of the wetlands in the VBTES Corridor, each wetland was also categorized by its form and/or position in the landscape. Wetland features typically included isolated depressions, linear depressions, water conveyance systems, water detention areas, and riparian wetlands.

Isolated depressions in the VBTES Corridor are typically small, irregularly shaped, low lying areas adjacent to the inactive rail line. These wetlands were formed by unnatural disturbances which resulted in a localized lowering of the topography and are not hydrologically connected to streams/rivers or other wetlands. The primary functions and values of isolated depressions are groundwater recharge and to a lesser degree, sediment/toxicant retention.

Linear depression wetlands in the VBTES Corridor are typically long, narrow, low-lying areas or shallow ditches that run parallel to the former rail line. These are by far the most common wetland type found in the VBTES Corridor, and vary considerably in terms of their length and width.

These linear depressions are usually located at the base of the ballast slope in the former NSRR ROW but are also found adjacent to some city roads. Most of the linear depression wetlands identified in the VBTES Corridor are not connected to streams or other waterways and are considered hydrologically isolated. The primary functions and values of the linear wetlands are groundwater recharge and sediment/toxicant retention.

Wetlands in the water conveyance category are typically long, narrow, channelized areas parallel to the inactive rail line. These wetlands are usually located just beyond the base of the ballast slope and are formed by regular drainage and flow patterns along the base of the slope of the rail line. The water conveyance wetlands, unlike most of the linear depression wetlands, are connected to other wetlands or waterways and convey stormwater flows to receiving waters on or off the VBTES Corridor. The primary functions of the water conveyance wetlands are groundwater recharge, sediment/toxicant retention, seasonal shellfish habitat (as crayfish burrows were observed), and shoreline stabilization.

Wetlands in the water detention category are typically oblong, depressed areas that are perpendicular to the VBTES Corridor and include constructed stormwater basins. These wetlands typically receive stormwater runoff and other drainage flows from sources beyond the immediate study area, in addition to runoff from the VBTES Corridor. They retain the water in a basin and gradually convey it via culverts to other wetlands or watercourses. The primary functions and values of the water detention wetlands are groundwater recharge, floodflow alteration, sediment/toxicant retention, fish, and seasonal shellfish habitat (crayfish burrows were observed).

Riparian wetlands within the VBTES Corridor are typically floodplain areas along a stream or creek. The primary functions of these wetlands are groundwater recharge, floodflow alteration, fish and shellfish habitat, wildlife habitat, shoreline stabilization, recreation, and aesthetics.

The characteristics of the wetlands in each of the alignment segments are described in the following sections. The area of each of the Cowardin wetland classifications in each of the

Table 5.3-1 | Wetland Types within the Newtown Road Station to Town Center Station Segment

Cowardin Classification	Wetland Area (ac)	Typical Dominant Vegetation
Palustrine Emergent (PEM)	2.04	Decodon verticillatus, Phragmites australis, Typha latifolia, Schoenoplectus tabernaemontani, Panicum virgatum, Verbena hastata, Agrostis gigantea, Polygonum spp., Carex spp., Juncus spp., Cornus sericea
Palustrine Scrub-Shrub (PSS)	1.27	Morella cerifera, Rosa multiflora, Cornus sericea, Liquidambar styraciflua, Acer rubrum, Panicum virgatum, Schoenoplectus tabernaemontani, Lonicera japonica, Polygonum spp., Juncus spp., Carex spp.
Palustrine Forested (PFO)	0.27	Liquidambar styraciflua, Sassafras albidum, Acer rubrum, Rosa multiflora, Panicum virgatum, Smilax rotundifolia
Estuarine Emergent (E2EM)	0.00	Spartina alterniflora, Spartina patens, Phragmites australis, Panicum virgatum, Baccharis halimifolia
Total	3.58	

Source: Fitzgerald & Halliday, 2013

Table 5.3-2 | Wetland Types within the Town Center Station to Rosemont Station Segment

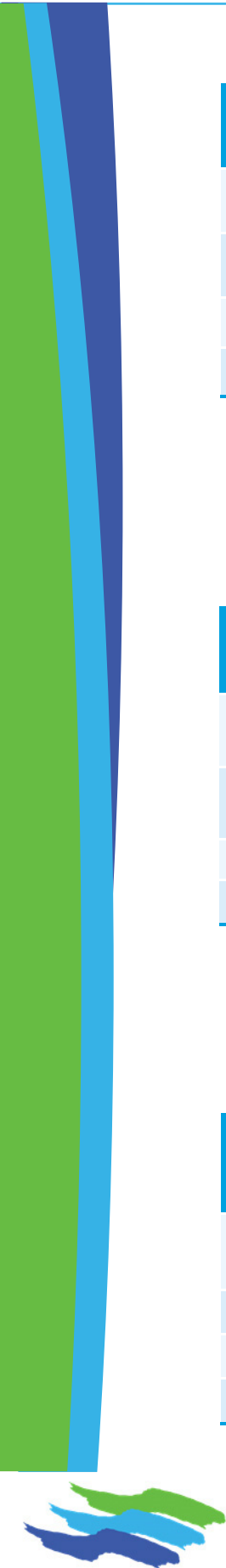
Cowardin Classification	Wetland Area (ac)	Typical Dominant Vegetation
Palustrine Emergent (PEM)	0.79	Decodon verticillatus, Phragmites australis, Typha latifolia, Schoenoplectus tabernaemontani, Panicum virgatum, Verbena hastata, Agrostis gigantea, Polygonum spp., Carex spp., Juncus spp., Cornus sericea
Palustrine Scrub-Shrub (PSS)	0.44	Morella cerifera, Rosa multiflora, Cornus sericea, Liquidambar styraciflua, Acer rubrum, Panicum virgatum, Schoenoplectus tabernaemontani, Lonicera japonica, Polygonum spp., Juncus spp., Carex spp.
Palustrine Forested (PFO)	0.00	Liquidambar styraciflua, Sassafras albidum, Acer rubrum, Rosa multiflora, Panicum virgatum, Smilax rotundifolia
Estuarine Emergent (E2EM)	0.36	Spartina alterniflora, Spartina patens, Phragmites australis, Panicum virgatum, Baccharis halimifolia
Total	1.59	

Source: Fitzgerald & Halliday, 2013

Table 5.3-3 | Wetland Types within the Rosemont Station to London Bridge Creek Segment

Cowardin Classification	Wetland Area (ac)	Typical Dominant Vegetation
Palustrine Emergent (PEM)	0.82	Panicum virgatum, Decodon verticillatus, Schoenoplectus tabernaemontani, Arundinaria gigantea, Phragmites australis, Typha latifolia, Polygonum spp., Carex spp., Juncus spp.
Palustrine Scrub-Shrub (PSS)	0.49	Acer rubrum, Acer negundo, Morella cerifera, Panicum virgatum, Juncus spp., Carex spp.
Palustrine Forested (PFO)	0.26	Platanus occidentalis, Acer negundo, Acer rubrum, Morella pensylvanica, Polygonum hydropiperoides, Arundinaria gigantea
Estuarine Emergent (E2EM)	0.68	Spartina alterniflora, Spartina patens, Morella pensylvanica
Total	2.25	

Source: Fitzgerald & Halliday, 2013



segments along with the dominant vegetation found in each wetland is presented in **Tables 5.3-1, 5.3-2, 5.3-3, 5.3-4, and 5.3-5**. Additional information is provided in **Appendix M**.

#### Newtown Road Station to Town Center Station along the former NSRR ROW (Alternatives 1A, 1B, 2, and 3)

This portion of the VBTES Corridor runs along the former NSRR ROW. More than half (24) of the wetland areas in this segment are linear depressions (see **Figure 5.3-1**) and 12 areas are water conveyance wetlands (see **Figure 5.3-2**). Most of the linear depressions and water conveyance wetlands are vegetated with herbaceous species (PEM wetlands), although some also have a shrub component (PSS wetlands). The largest wetlands within this segment are those associated with the non-tidal portion of Thalia Creek.

#### Town Center Station to Rosemont Station along the former NSRR ROW (Alternatives 1B, 2, and 3)

This portion of the VBTES Corridor runs along the former NSRR ROW. Three of the wetland areas in this segment are linear depressions (see **Figure 5.3-1**) and two are water conveyance wetlands (see **Figure 5.3-2**). Most of the linear depressions and water conveyance wetlands are vegetated with herbaceous species (PEM wetlands), although some also have a shrub component (PSS wetlands). The largest wetlands within this segment are those associated with the tidally influenced portion of Thalia Creek. Measuring the typical channel width, the creek is approximately 75 feet wide at the former NSRR ROW. There are some wider tidal marsh areas both upstream and downstream, but the area of tidal marsh vegetation immediately at the crossing is relatively narrow. The tidal marsh vegetation consists of native species as well as invasive species such as common reed. Thalia Creek at the ROW crossing is depicted in **Figure 5.3-3**.

#### Rosemont Station to London Bridge Creek along the former NSRR ROW (Alternatives 2 and 3)

The wetlands in the Rosemont Station to London Bridge Creek segment that are within and adjacent to the former NSRR ROW are similar to the Newtown Road Station to Rosemont Station segment wetlands described above. The

**Figure 5.3-1 | Typical Linear Depression Wetland**



Source: Fitzgerald & Halliday, 2013

**Figure 5.3-2 | Typical Water Conveyance Wetland**



Source: Fitzgerald & Halliday, 2013

**Figure 5.3-3 | Thalia Creek**



Source: Fitzgerald & Halliday, 2014

**Figure 5.3-4 | London Bridge Creek**



Source: Fitzgerald & Halliday, 2013

**Figure 5.3-5 | Typical Stormwater Basin**



Source: Fitzgerald & Halliday, 2013

**Figure 5.3-6 | Upper Linkhorn Bay**



Source: Fitzgerald & Halliday, 2013

wetland system associated with London Bridge Creek is discussed in this section, including those in the VBTES Corridor on the east side of the creek. A total of 17 wetland areas were identified in this segment. Of these 17 wetlands, 11 are linear depressions and two are water conveyance wetlands. Most of the linear depressions and water conveyance wetlands are PEM wetlands, although some shrub species are present in some of these wetlands. The largest wetlands within this alignment segment are the tidal wetlands associated with London Bridge Creek. The width of the creek under the existing railway bridge is about 115 feet due to embankments that extend into the floodplain. Immediately south of the bridge, the creek is about 200 feet wide; immediately north, it is about 150 feet wide. There is a relatively narrow area of native saltmarsh vegetation along the shoreline of London Bridge Creek at the former NSRR ROW crossing. London Bridge Creek at the former NSRR crossing is depicted in **Figure 5.3-4**.

#### London Bridge Creek to Oceanfront via former NSRR ROW – Birdneck Road – 17<sup>th</sup> Street – 19<sup>th</sup> Street (Alternative 2)

A total of 16 wetland areas were identified in this segment. Of these 16 areas, six are linear depressions, four are water conveyance wetlands, and one is an isolated depression. Most of the wetlands in this segment are linear depressions or water conveyance wetlands that are a combination of forested (PFO) wetlands, with some having a scrub-shrub (PSS) component. Herbaceous species are also present in the understory. Forested and emergent wetlands (PEM) containing both native and non-native species border Great Neck Creek at the location of the crossing. The PEM wetlands along Great Neck Creek are dominated by the invasive common reed.

#### London Bridge Creek to Oceanfront via Laskin Road – Birdneck Road – 19<sup>th</sup> Street (Alternative 3)

A total of 11 wetland areas were identified in this alignment segment, of which four are stormwater basins (see **Figure 5.3-5**), one is a linear depression, and two are water conveyance wetlands. The largest wetlands within this segment are the tidal wetlands associated with Upper Linkhorn Bay. Upper Linkhorn Bay is a tidally-influenced, estuarine system (see **Figure 5.3-6**). The width of the bay is



approximately 100 feet wide at the Laskin Road crossing, and it widens out north and south of the bridge. There is a relatively narrow area of saltmarsh vegetation along the shoreline of Upper Linkhorn Bay at the Laskin Road crossing. The tidal marsh vegetation consists of both native species as well as invasive species such as common reed.

LRT/BRT VSMF (LRT Alternatives 2 and 3, BRT Alternatives 1A, 1B, 2, and 3)

The proposed LRT/BRT VSMF site is located on property owned by the City of Virginia Beach north of Potters Road between London Bridge Road and First Colonial Road. The site’s prior uses were as a borrow pit for construction of what is now I-264 then later as a landfill for dredged material and temporary storage of storm debris and other materials. The central portion of this site is highly disturbed where the debris and soil are actively being deposited and moved around. One wetland was identified along the east perimeter of this area, consisting of a water conveyance wetland that is a combination of PFO, PSS, and PEM wetlands. The southern portion of this wetland extends into the former NSRR ROW Alternative 2 segment east of London Bridge Creek and is included in **Table 5.3-4**. The portion of this wetland that is within the VSMF is approximately 0.17 acres. The northern portion of the VSMF site (approximately 20 acres) has not been field investigated. Based on aerial photography investigation, it appears additional wetlands may be present in this area. During the FEIS, when a locally preferred alternative has been selected and the design has been advanced, the wetland boundaries would be field delineated and a JD would be obtained.

5.3.4 Environmental Impacts

No Build Alternative

Under the No Build alternative, there would be no construction or impacts to wetlands within the former NSRR ROW or additional impacts at the City of Virginia Beach site on Potters Road. However, the Laskin Road widening would still be undertaken. The majority of the Laskin Road widening would take place in developed upland areas, although some wetlands would be impacted. Impacted wetlands would include highly disturbed linear depression

Table 5.3-4 | Wetland Types within the London Bridge Creek to Oceanfront via former NSRR ROW Segment

Cowardin Classification	Wetland Area (ac)	Typical Dominant Vegetation
Palustrine Emergent (PEM)	0.63	Phragmites australis, Schoenoplectus tabernaemontani, Panicum virgatum, Carex spp., Juncus spp., Polygonum spp.
Palustrine Scrub-Shrub (PSS)	0.12	Acer rubrum, Acer negundo, Robinia pseudoacacia, Typha latifolia, Schoenoplectus tabernaemontani
Palustrine Forested (PFO)	2.32	Acer rubrum, Liquidambar styraciflua, Acer negundo, Rosa multiflora, Morella pensylvanica, Panicum virgatum, Arundinaria gigantea, Phragmites australis, Schoenoplectus tabernaemontani, Smilax rotundifolia
Total	3.07	Source: Fitzgerald & Halliday, 2013

Table 5.3-5 | Wetland Types within the London Bridge Creek to Oceanfront via Laskin Road Segment

Cowardin Classification	Wetland Area (ac)	Typical Dominant Vegetation
Palustrine Emergent (PEM)	0.80	Typha latifolia, Juncus effusus, Polygonum sp., Schoenoplectus tabernaemontani, Toxicodendron radicans
Palustrine Forested (PFO)	0.13	Acer rubrum, Liquidambar styraciflua, Nyssa sylvatica, Clethra alnifolia, Juncus effusus, Decodon verticillatus
Estuarine Emergent (E2EM)	0.24	Spartina alterniflora, Spartina patens, Phragmites australis, Panicum virgatum, Solidago sempervirens, Baccharis halimifolia
Total	1.17	Source: Fitzgerald & Halliday, 2013

Table 5.3-6 | Potential Wetland Impacts for Alternative 1A

Cowardin Classification	Potentially Hydrologically Connected Wetlands (ac) <sup>a</sup>	Isolated Wetlands within the LOD (ac) <sup>b</sup>
Palustrine Emergent (PEM)	1.10	0.94
Palustrine Scrub-Shrub (PSS)	0.73	0.54
Palustrine Forested (PFO)	0.00	0.27
Estuarine Emergent (E2EM)	0.00	0.00
Total	1.83	1.75

Notes: a Wetlands that are potentially federally regulated subject to future USACE JD  
b Includes 1.26 acres of isolated linear ditch wetlands  
Source: Fitzgerald & Halliday, 2013

and water conveyance wetlands and stormwater basins with low wetland functions and values. The only potentially higher resource value wetland that would be impacted as a result of the road widening project would be at Upper Linkhorn Bay, where minor impacts from widening the bridge may occur. In conclusion, all potential impacts would take place in low quality, disturbed wetlands, with the exception of the Upper Linkhorn Bay crossing which may have minor impacts to higher quality wetlands.

LRT Build Alternatives

Wetland impacts for the build alternatives were categorized into impacts to wetlands that are potentially hydrologically connected to streams or other off site wetland systems and impacts to isolated, unconnected wetlands within the LOD. The wetlands that are hydrologically connected to other wetlands and/or streams are potentially regulated by the USACE as well as by the DEQ. Impacts to these wetlands would be mitigated as described below. Isolated wetlands within the LOD are wetlands with no apparent connection to offsite streams or other wetland systems. Many of these isolated wetlands within the LOD are linear depression wetlands formed from man-made ditches. When a locally preferred alternative is chosen, the USACE, DEQ, and other applicable regulatory agencies would be consulted to determine the extent of wetlands under their jurisdiction that would be impacted and the level of mitigation necessary.

ALTERNATIVE 1A: Town Center Alternative

During construction of Alternative 1A, all of the existing wetlands within the LOD would be directly impacted. Impacts to wetlands that are potentially hydrologically connected and isolated wetlands that are entirely within the LOD for Alternative 1A are summarized by Cowardin (NWI) classification in **Table 5.3-6**.

Of the approximately 3.6 acres of wetlands that would be impacted, about 1.75 acres are isolated wetlands within the LOD. There are no major water crossings associated with the wetlands that would be impacted as part of this alternative. All wetland impacts would be mitigated in accordance with USACE and DEQ requirements.

ALTERNATIVE 1B: Rosemont Alternative

During construction of Alternative 1B, all of the existing wetlands within the LOD would be directly impacted. Impacts to wetlands that are potentially hydrologically connected and isolated wetlands that are entirely within the LOD for Alternative 1B are summarized by Cowardin (NWI) classification in **Table 5.3-7**.

Of the approximately five acres of wetlands that would be impacted, about two acres are isolated wetlands within the LOD. Several areas of larger wetland systems would also be directly impacted; however, the impacts would occur along the edge of these wetlands, and they would not impact the overall functions or values of the larger wetland area. These impacts would represent a net loss of wetlands that would require mitigation. The potential for in-water work and wetland impacts exist for the crossing of Thalia Creek due to abutment and pier improvements; however, the extent of these impacts would not be quantifiable until the detailed design and permitting stage of the project. All wetland impacts would be mitigated in accordance with USACE and DEQ requirements.

ALTERNATIVE 2: NSRR Alternative

Under Alternative 2, the types of wetland impacts would be similar to those described for Alternatives 1A and 1B; however, they would occur along an extended corridor that follows the former NSRR ROW. In the portion of the VBTES Corridor between Birdneck Road and the Oceanfront Station, the LRT would run through the median or along the edges of city streets where there are no wetlands.

During construction of Alternative 2, all of the existing wetlands within the LOD would be directly impacted. Impacts to wetlands that are potentially hydrologically connected and isolated wetlands that are entirely within the LOD for Alternative 2 are summarized by Cowardin classification in **Table 5.3-8**.

Of the approximately 10.5 acres of wetlands to be impacted about a third of the wetland impacts occur to smaller isolated wetlands within the LOD. Several areas of larger wetland systems would also be impacted. However, the impacts would occur along the edge of these larger wetlands, and would not impact the overall value or

Table 5.3-7 | Potential Wetland Impacts for Alternative 1B

Cowardin Classification	Potentially Hydrologically Connected Wetlands (ac) <sup>a</sup>	Isolated Wetlands within the LOD (ac) <sup>b</sup>
Palustrine Emergent (PEM)	1.73	1.11
Palustrine Scrub-Shrub (PSS)	1.14	0.56
Palustrine Forested (PFO)	0.00	0.27
Estuarine Emergent (E2EM)	0.36	0.00
<b>Total</b>	<b>3.23</b>	<b>1.94</b>

Notes: a Wetlands that are potentially federally regulated subject to future USACE JD  
b Includes 1.452 acres of isolated linear ditch wetlands.

Source: Fitzgerald & Halliday, 2013

Table 5.3-8 | Potential Wetland Impacts for Alternative 2

Cowardin Classification	Potentially Hydrologically Connected Wetlands (ac) <sup>a</sup>	Isolated Wetlands within the LOD (ac) <sup>b</sup>
Palustrine Emergent (PEM)	2.26	2.03
Palustrine Scrub-Shrub (PSS)	1.14	1.17
Palustrine Forested (PFO)	2.30	0.55
Estuarine Emergent (E2EM)	1.04	0.00
<b>Total</b>	<b>6.74</b>	<b>3.75</b>

Notes: a Wetlands that are potentially federally regulated subject to future USACE JD  
b Includes 2.62 acres of isolated linear ditch wetlands

Source: Fitzgerald & Halliday, 2013

Table 5.3-9 | Potential Wetland Impacts for Alternative 3

Cowardin Classification	Potentially Hydrologically Connected Wetlands (ac) <sup>a</sup>	Isolated Wetlands within the LOD (ac) <sup>b,c</sup>
Palustrine Emergent (PEM)	2.27	2.20
Palustrine Scrub-Shrub (PSS)	1.26	1.05
Palustrine Forested (PFO)	0.32	0.45
Estuarine Emergent (E2EM)	1.28	0.00
<b>Total</b>	<b>5.13</b>	<b>3.69</b>

Notes: a Wetlands that are potentially federally regulated subject to future USACE JD  
b Includes wetland impacts from lead track, 0.12 acres of PSS and 0.11 acres PFO  
c Includes 2.81 acres of isolated linear ditch wetlands

Source: Fitzgerald & Halliday, 2013

integrity of the larger wetland area. In addition to Thalia Creek, Alternative 2 would cross Pinetree Branch, London Bridge Creek and Great Neck Creek. Potential impacts and impact minimization measures for these watercourse crossings are similar to those discussed for Thalia Creek in Alternative 1B above. The potential for in-water work and wetland impacts exist for the crossing of London Bridge Creek due to abutment and pier improvements; however, the extent of these impacts would not be quantifiable until the detailed design and permitting stage of the project. All wetland impacts would be mitigated in accordance with USACE and DEQ requirements.

ALTERNATIVE 3: Hilltop Alternative

Under Alternative 3, wetland impacts to the area along the former NSRR ROW between Newtown Road and London Bridge Creek would be similar to those described for Alternatives 1A, 1B, and 2. Alternative 3 would also include a new lead track to access the VSMF, which would be located in the former NSRR ROW in the same fashion as the Alternative 2 mainline track. The impact to wetlands along the Laskin Road corridor would be minimal, since this corridor is highly developed with roadways and there are few wetlands. There are no wetland resources in the VBTES Corridor for this alternative from Birdneck Road to the Oceanfront Station.

During construction of the light rail system, all of the existing wetlands within the LOD would be directly impacted. Impacts to wetlands that are potentially hydrologically connected and to isolated wetlands that are entirely within the LOD for Alternative 3 are summarized by Cowardin classification in **Table 5.3-9**. Of the approximately 9 acres of wetland impacts almost half of the wetland impacts are to smaller isolated wetlands within the LOD. Several areas of larger wetland systems would also be impacted; however, the impacts occur along the edge of these wetlands and would not impact the overall value or integrity of the larger wetland area. Potential impacts and impact minimization measures for watercourse crossings are similar to those discussed for Thalia Creek in Alternative 1B. The potential for in-water work and wetland impacts exist for the crossing of Upper Linkhorn Bay due to abutment and pier improvements; however, the extent of

these impacts would not be quantifiable until the detailed design and permitting stage of the project. All wetland impacts would be mitigated in accordance with USACE and DEQ requirements.

#### LRT VSMF

One wetland was identified along the east perimeter of the LRT VSMF. Direct impacts to wetlands in the LRT VSMF include 0.17 acres of forested/scrub-shrub/emergent wetland. The same VSMF location would be used for Alternatives 2 and 3. Aerial photography indicates that additional wetlands may occur around the eastern and northern perimeter of the VSMF; however, it is not anticipated that the project would affect these wetlands.

#### BRT Build Alternatives

All of the BRT alternatives would be located along the previously described LRT alternatives' routes. Construction of the BRT guideway would clear the same areas as that identified for the LRT modes, and therefore the wetland impacts would be similar to those described for the LRT alternatives. The BRT system would use the same site as that proposed for the LRT for its VSMF, but it would be constructed under all of the BRT alternatives. Under Alternative 3, BRT vehicles would use existing roadways to access the VSMF, so the impacts associated with the lead track, 0.11 acres of forested wetlands and 0.12 acres of scrub-shrub wetlands, would not occur.

#### 5.3.5 Construction Impacts

Short-term impacts resulting from construction of any of the build alternatives include a potential increase in water turbidity and temporary changes in water color and clarity due to the potential for erosion and sedimentation from soil disturbance during construction. However, the impact potential is low due to the narrow nature of the LOD and minimal topographic slope along the VBTES Corridor. Construction BMPs and appropriate use of erosion and sediment control devices would further minimize the effects of erosion and sedimentation, and thus the potential for water quality impacts during construction to wetlands that are adjacent to the VBTES Corridor. A detailed discussion of potential water quality impacts and BMPs is provided in **Section 5.2**. In addition, all construction access to the ROW

would occur from existing public roads and along the former NSRR ROW itself; therefore, no temporary construction roads would be built through wetland areas outside the proposed LOD. Temporary sedimentation basins may be required for parts of the project, but these would be built within the proposed LOD as well. Stockpile and staging areas would not be located within wetland areas and the surrounding areas would be protected by erosion and sedimentation control fencing.

#### 5.3.6 Indirect Effects

There is the potential to indirectly impact wetlands and aquatic habitat resources associated with the major water crossings through increased stormwater runoff during construction and project operation. However, best management practices (BMPs) would be employed during construction and for long-term management of stormwater to improve stormwater quality and reduce flows, thereby minimizing impacts (see **Section 5.2** for additional detail). BMPs could include the use of retention basins, filter strips, and grass-lined swales, or other measures to improve stormwater quality and manage stormwater flows within the VBTES Corridor. In addition, a Stormwater Management Plan, including an Erosion and Sediment Control Plan, meeting the City's design specifications for development within RPAs would be implemented. This would ensure the final project design meets City and state requirements for stormwater management and maintenance of water quality. A detailed discussion on potential water quality impacts is presented in **Section 5.2**.

#### 5.3.7 Avoidance, Minimization, and Mitigation

The build alternatives all follow an existing inactive railroad corridor and city roads within a largely developed urban/suburban corridor. As a result, few opportunities for avoidance and minimization of wetland impacts are available for the build alternatives. Additional measures to minimize impacts to wetlands may be undertaken when the project design is further refined. In particular, the potential to reduce wetland impacts associated with the replacement of the existing bridges across the major water crossings would be investigated. Other minimization techniques may also be

integrated into the design, such as slight horizontal and vertical adjustments to the alignment, steepening of side slopes in the vicinity of wetland areas, the use of ballast curb sections and subsurface drainage instead of open ditches, and locating non-essential facilities outside wetland areas.

Potential water quality related impacts to wetlands and aquatic resources during construction would be mitigated through implementation of the Erosion and Sediment Control Plan and adherence to applicable guidelines. Additionally, potential water quality impacts from the increased impervious surface area after construction would be mitigated through implementation of the approved Stormwater Management Plan. To the extent possible, native species would be planted within the stormwater treatment facilities (i.e., detention basins and vegetated swales).

When a locally preferred alternative is chosen, the regulatory agencies would be consulted to determine the extent of wetlands that are under their jurisdiction that would be impacted. For unavoidable wetland impacts, compensatory wetland mitigation would be required with the goal of "no net loss" of wetlands. The amount and type of wetland mitigation that would be required would be determined based on the impacts to regulated wetlands. Consultation with the USACE, DEQ, VMRC, local wetland boards and other applicable resource agencies would be undertaken throughout the development of the wetland mitigation plan to assure the plan is acceptable to the regulatory agencies. The wetlands mitigation plan would be developed following Norfolk District Corps and DEQ Recommendations for Wetland Compensation and Mitigation: Including Site Design, Permit Conditions, Performance, and Monitoring Criteria (USACE, 2004).

The wetland mitigation plan could include a combination of wetland restoration, wetland enhancement, or wetland creation as agreed upon with the regulatory agencies. Wetland mitigation may also be achieved through acquisition of credits from an approved mitigation bank or by payments to an in-lieu fee program, such as the Virginia Aquatic Resources Trust Fund, if a mitigation bank isn't readily available. The overall goal of this program is a no net

loss of wetland acreage. Wetland acreage replacement ratios are used to determine the amount of mitigation required based on the type of wetlands that are impacted. The DEQ generally uses the mitigation ratios listed below as guidance when compensation is required for a Virginia Water Permit (VWP) general permit activity. Alternative ratios may be required by DEQ for activities permitted under a VWP individual permit, and are determined on a case-by-case basis.

- ~ forested wetland (PFO) impacts: 2 acres compensation for each 1 acre of impact (2:1)
- ~ scrub-shrub wetland (PSS) impacts: 1.5:1 compensation
- ~ emergent wetland (PEM) impacts: 1:1 compensation
- ~ other surface water impacts: project-specific ratios

Linear depression PEM wetlands within the LOD would be directly impacted. However, any build alternative would require construction of new drainage ditches. The feasibility of establishing wetlands as part of the project drainage system would be evaluated during the detailed design and permitting process. The mitigation for unavoidable impacts to wetlands connected to larger wetland systems or waterways outside the VBTES Corridor would use mitigation ratios agreed upon by the USACE and DEQ during the permitting process. All wetland impacts would be mitigated in accordance with USACE and DEQ requirements.

### 5.4 Floodplains

This section provides an inventory of floodplains, floodways, and coastal high-hazard areas within the VBTES Corridor. It identifies potential direct and indirect impacts to those resources due to the implementation of the alternatives and, where applicable, identifies mitigation measures for potential adverse impacts.

#### 5.4.1 Legal and Regulatory Context

The following regulations guide development within floodplains, floodways, and coastal high hazard areas.

- ~ **Executive Order 11988 (Floodplain Management):**

Executive Order 11988 requires that any federal agency's project construction, permitting, or funding avoid incompatible floodplain development, be consistent with the standards and criteria of the National Flood Insurance Program (NFIP), and restore and preserve natural and beneficial floodplain values.

- ~ **National Flood Insurance Act (42 USC 4001 et seq.):** The purpose of the National Flood Insurance Act is to identify flood-prone areas and to ensure that insurance is provided for these areas. The act requires the purchase of insurance for buildings in special flood-hazard areas. The act is applicable to any federally assisted acquisition or construction projects in an area identified as having special flood hazards. Projects should avoid construction in, or develop a design to be consistent with, Federal Emergency Management Agency (FEMA)-identified flood-hazard areas. The City of Virginia Beach Department of Public Works and the Department of Planning are responsible for the administration of the National Flood Insurance Program for the City.
- ~ **Virginia Flood Damage Reduction Act of 1989 (Code of Virginia 10.1-604 et seq.):** This act names the Virginia Department of Conservation and Recreation (DCR) as the coordinating agency for floodplain management in Virginia, consistent with the National Flood Insurance Program. The act also authorizes the establishment of local floodplain management ordinances. In developing floodplain management ordinances, participating communities must meet or exceed the regulatory standards issued by FEMA. Under this act, all construction or land disturbing activities initiated by any 'agency of the Commonwealth' must comply with the locally adopted floodplain management ordinance.
- ~ **Virginia Uniform Statewide Building Code:** This code sets construction standards for structures built in FEMA-designated flood hazard areas. It is adopted by the Virginia Board of Housing and Community Development and enforced by local governments.

~ **Virginia Beach City Code, Appendix K (Floodplain Ordinance):** This ordinance provides procedures and regulations for floodplains within the City, including floodplain management regulations enacted under the authority of the Virginia Flood Damage Reduction Act of 1989. This ordinance strictly prohibits any use or structure or substantial improvement to existing structure in any floodway, if such use or structure or substantial improvement would adversely affect normal flood flow, or would increase flooding of lands above or below the property, or would increase erosion within or adjoining to floodway, or would cause diversion of floodwaters in any manner more likely to create damage than does flow in a normal course, or would increase peak flows or velocities in a manner likely to lead to added property damage or hazards to life, or would increase amounts of damaging materials, including those likely to be injurious to health, which might be carried downstream in floods. Encroachments, including fill, new construction, substantial improvements, and other development within the regulatory floodway, that would result in any increase in flood levels within the community during the occurrence of the base flood discharge are specifically prohibited. No variance shall be granted for any development, use, or activity within any regulatory floodway that would cause an unacceptable increase in flood heights.

#### 5.4.2 Methodology

Floodplains considered in the analysis are areas that have a one percent (1%) probability of being inundated in a given year, commonly known as 100-year floodplains. Floodways are the stream or river channels and adjacent areas within the floodplain that carry the fast-moving water during periods of flooding. These areas are subject to stringent development regulations with the goal of reducing encroachment on the floodway and floodplain and preserving the flood flow and storage capacity of the resource. Coastal high hazard areas are shoreline or coastal areas subject to a one percent (1%) probability flood event (also called the 100-year flood) that have the added hazard

of storm-induced waves.

Floodplains in the study area were identified using FEMA geographic information system (GIS) mapping depicting 100-year floodplains and floodways (as depicted on the local Flood Insurance Rate Maps – FIRM). This data was referenced against the Virginia Department of Environmental Quality (DEQ) and Department of Conservation and Recreation (DCR) information on floodplains. In addition, the City of Virginia Beach Special Flood Hazard Area (SFHA), as defined in the Floodplain Ordinance, was consulted. Per state standards, floodplain districts described in the local ordinance must include all the different SFHA on the community's FIRM and the corresponding requirements from the NFIP including floodplain boundaries, delineated floodways, and coastal high hazard areas.

Construction limits of the project based on the conceptual plans were used as the boundary for determining if a floodplain, floodway, or coastal high hazard area would potentially be impacted by an alternative. A potential for direct impacts was considered to occur where project activities would be located within the boundaries of the 100-year floodplain, floodway, or coastal high hazard area. Due to the fact that the design is at a conceptual stage, areas of cut and fill along the VBTES Corridor have not been quantified at this time, except at two of the water crossings. As such, the impacts analysis examines the acreage of impact under each of the build alternatives. The areas of disturbance would be further quantified in the FEIS when a locally preferred alternative is selected and the design is advanced.

Indirect impacts were assessed by considering the potential for off-site or delayed effects such as changes in flooding patterns and/or increased risks of downstream flooding. The scale of the project mapping and conceptual designs used to evaluate alternatives in this DEIS is intended for analyzing trends over large areas (the entire VBTES Corridor). The results of the assessment provide an understanding of possible scale-of-magnitude impacts and point to locations of particular potential concern. As the locally preferred alternative is advanced to final design and

construction, site-specific plans, surveys, and mapping would be produced. These site-specific plans would identify the precise location, type, and volume of fill that would be placed within floodplains, floodways, and coastal high hazard areas. In addition, detailed hydraulic studies would be conducted to determine the specific effects of project construction activities. This information would be displayed on a site plan and in supporting documentation as part of compliance with the required administrative review by the City Engineer in accordance with the City Code. The information for this site plan review would include specifics on mitigation, if necessary, to offset the loss of flood storage capacity that may result from filling.

#### 5.4.3 Existing Conditions

The VBTES Corridor is surrounded by waterways on four sides, including the Atlantic Ocean to the east, the Chesapeake Bay to the north, the Elizabeth River to the west, and the Eastern Branch of the Elizabeth River and its tributaries to the south. The VBTES Corridor is located in a coastal area characterized by relatively flat topography with an elevation that generally ranges from 15 to 21 feet above mean sea level; in the Hilltop area, elevations increase up to 27 feet. One hundred-year floodplains occupy lower elevation areas ranging from seven to twelve feet above mean sea level. There are no coastal high hazard areas within the immediate VBTES Corridor; these areas are found to the east along the shore of the Atlantic Ocean (City of Virginia Beach, 2009).

Floodplain and floodway locations are shown in **Figure 5.4-1**. Areas where the project alternatives intercept the 100-year floodplain or floodway are shown in **Table 5.4-1**.

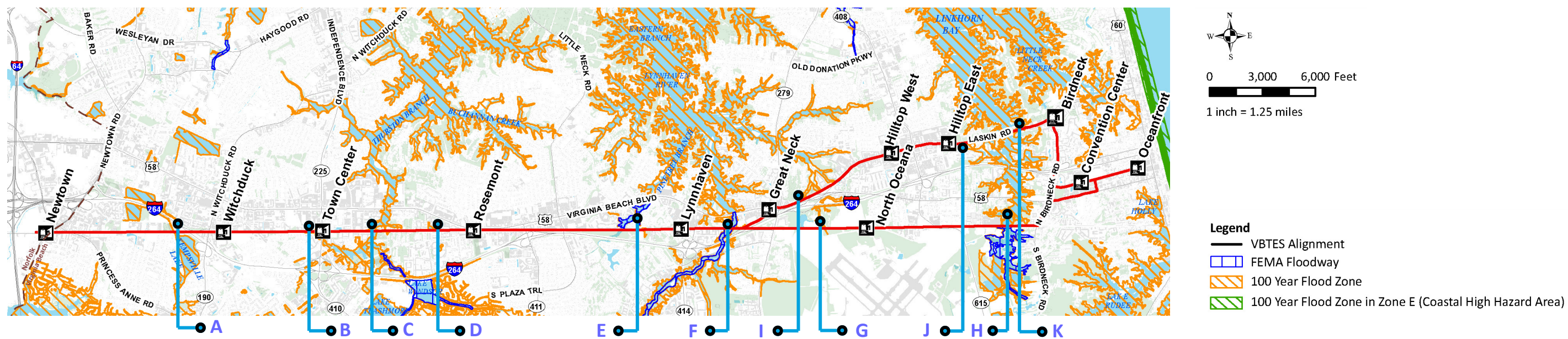
#### 5.4.4 Environmental Impacts

##### No Build Alternative

Under the No Build alternative, the VBTES project would not be undertaken. However, the widening of Laskin Road is a planned and funded project and would occur regardless of the VBTES project. There is the potential for the widening of



Figure 5.4-1 | Floodplains, Floodways, and Coastal High Hazard Areas



Source: Fitzgerald & Halliday, 2014

Table 5.4-1: Floodplains and Floodways within the VBTES Corridor

Map Key	Associated Waterbody	Floodplain (FP)/ Floodway (FW) Present	Approximate Location	Acres Disturbed
A	Kempsville Lake	Floodplain	Former NSRR ROW at Bowery Street	.04 acres (FP)
B	Thalia Creek	Floodplain	Former NSRR ROW West of Independence Boulevard	.57 acres (FP)
C	Thalia Creek	Floodplain	Southern Boulevard West of S. Gum Avenue	1.52 acres (FP)
D	Thalia Creek	Floodplain	East of Thalia Station Circle	.01 acres (FP)
E	Pinetree Branch	Floodplain	West of Pinewood Drive	.06 acres (FP)
F	London Bridge Creek	Floodplain/Floodway	Former NSRR ROW west of Parker Lane	1.09 acres (FP) .56 acres (FW)
G	Wolfsnare Creek	Floodplain	Former NSRR ROW east of London Bridge Road	.05 acres (FP)
H	Great Neck Creek	Floodplain/Floodway	Former NSRR ROW east of South Sykes Avenue	.56 acres (FP) .37 acres (FW)
I	Wolfsnare Creek	Floodplain	Laskin Road at Chapel Lake Drive	.01 acres (FP)
J	Upper Linkhorn Bay	Floodplain	Laskin Road east of Winwood Drive	5.70 acres (FP)
K	Upper Linkhorn Bay	Floodplain	Laskin Road at Bayway Road	.30 acres (FP)

Source: Fitzgerald & Halliday, 2014.

Table 5.4-2: Floodplain Impact Summary

Alternative	Total Acres Disturbed	Acres Disturbed within Floodplain
Alternative 1A	56 acres	0.6 acres
Alternative 1B	74 acres	2.1 acres
Alternative 2	197 acres	3.9 acres
Alternative 3	216 acres	9.3 acres

Source: Fitzgerald & Halliday, 2014.

Laskin Road to have construction-related impacts on floodplains. However, these effects would be avoided and/or minimized through the implementation of mandatory BMPs during construction. The No Build alternative is not expected to have any adverse long-term impacts on floodplains or flooding.

LRT Build Alternatives

ALTERNATIVE 1A: Town Center Alternative

Under Alternative 1A, between 24 and 36 inches of soil would be removed, and ditches would be constructed along the length of the VBTES Corridor. Impacts under Alternative 1A would be to small areas of floodplain (see Table 5.4-1 and Table 5.4-2). These small floodplain disturbances consist of minor fill placement and are not anticipated to negatively affect flood storage, hydrology, or flood elevations. Of the 56 acres of disturbance along Alternative 1A, 0.6 acres lie within the 100-year floodplain.

All project activities occurring within a designated floodplain would be designed to comply with the City’s existing floodplain management requirements. Specifically, these improvements would be designed so as not to adversely

affect normal flood flow, or increase flooding of lands above or below the property, or increase erosion within or adjoining to floodway, or cause diversion of floodwaters in any manner more likely to create damage than does flow in a normal course, or increase peak flows or velocities in a manner likely to lead to added property damage or hazards to life, or increase amounts of damaging materials, including those likely to be injurious to health, which might be carried downstream in floods. As such, Alternative 1A would have no long-term adverse impacts to any 100-year floodplain, floodway, or coastal high hazard area.

#### ALTERNATIVE 1B: Rosemont Alternative

Under Alternative 1B, the construction and associated effects between Newtown Road and Town Center would be the same as those described for Alternative 1A. Between Town Center and the proposed Rosemont Station, between 24 and 36 inches of soil would be removed and ditches would be constructed along the length of the VBTES Corridor. While construction would be required within the floodplains in order to construct the Thalia Creek bridge and other project infrastructure, the majority of the impacts would be to small areas of floodplain (see **Table 5.4-1** and **Table 5.4-2**). These small floodplain disturbances consist of minor fill placement and are not anticipated to negatively affect flood storage, hydrology, or flood elevations. Of the 74 acres of disturbance along Alternative 1B, 2.1 acres lie within the 100-year floodplain. Although more than an acre would be disturbed at the Thalia Creek crossing, approximately 1,450 cubic yards of fill would be removed, thereby resulting in a beneficial impact by improving hydraulic conditions and increasing available flood storage capacity in this area.

All project activities occurring within a designated floodplain would be designed to comply with the City's existing floodplain management requirements as described above under Alternative 1A. Alternative 1B would have no long-term adverse impacts to any 100-year floodplain, floodway, or coastal high hazard area.

#### ALTERNATIVE 2: NSRR Alternative

Under Alternative 2, the construction and associated effects between Newtown Road and the proposed Rosemont Station would be the same as those described for Alternatives 1A and 1B. There would be no long-term adverse impacts to floodplains in this segment, and there would be beneficial impacts resulting from the removal of historic fill at the Thalia Creek bridge.

Between the Rosemont Station and the Oceanfront Resort Area on the former NSRR ROW, effects would be similar to those described between Newtown Road and Rosemont. In addition, at London Bridge Creek approximately 2,900 cubic yards of fill would be removed, thereby improving hydraulic conditions and resulting in a beneficial impact. Of the 197 acres that would be disturbed under Alternative 2, approximately 3.9 acres lie within the 100-year floodplain and 0.9 acres lie within the floodway. Although the two largest areas of floodplain impact would result in a positive impact to flood storage by removal of historic fill materials, there would be smaller areas of fill within floodplains as part of the project. These small floodplain disturbances consist of minor fill placement and are not anticipated to negatively affect flood storage, hydrology, or flood elevations. Overall, there would be no long-term adverse impacts to floodplains, floodways, or coastal high hazard areas as a result of Alternative 2.

#### ALTERNATIVE 3: Hilltop Alternative

Under Alternative 3, the effects would be similar to those described for Alternative 2 between Newtown Road and London Bridge Creek. There would be no long-term adverse impacts to floodplains in this segment, and there would be positive impacts resulting from the removal of fill at the crossings at Thalia Creek and London Bridge Creek. On Laskin Road, approximately 5.7 acres of the proposed Hilltop East Park & Ride lot currently lie within the 100-year floodplain. However, cut and fill would be minimized in the construction of the parking lot, and the lot would be designed so as to not affect normal flood flow. Long-term adverse impacts as a result of the construction of the lot are not anticipated. Of the 216 acres that would be disturbed under Alternative 3, approximately 9.3 acres lie within the

100-year floodplain and 0.6 acres lie within the floodway. The lead track to the VSMF within the former NSRR ROW would affect .05 acres of the floodplain near Wolfsnare Creek. Overall, long-term adverse impacts to floodplains, floodways, and coastal high hazard areas are not anticipated for Alternative 3.

#### LRT VSMF

The LRT VSMF does not lie within the 100-year floodplain.

#### BRT Build Alternatives

All of the BRT alternatives would be located along the previously described LRT alternatives' routes and the VSMF would be built at the same location as the LRT. Substantially similar impacts would occur along the BRT routes as described for the corresponding LRT alternatives.

### 5.4.5 Construction Impacts

The construction of the proposed project would result in areas of excavation and fill creating a temporary alteration of potential drainage and flooding conditions. It is assumed that dewatering during project construction would likely be necessary because the water table is relatively high throughout much of the VBTES Corridor. Water pumped from excavations would be discharged to nearby receiving waterbodies. This dewatering activity is unlikely to produce a volume of water capable of causing or exacerbating downstream flooding within the smaller streams. Another important consideration with respect to floodplain management during construction is limiting the placement of equipment, waste stockpile areas, and the storage of hazardous substances such as fuels within 100-year floodplain/flood prone areas. Construction BMPs would limit the placement of such materials within floodplain areas so as to reduce the potential to adversely affect water quality or flooding conditions.

Best management practices (as described further in **Section 5.2**) would also be employed to guard against erosion and sedimentation, substantive changes in the volumes of stormwater flows, and adverse alterations of existing conditions from dewatering activities. There is the potential for localized minor flooding issues from

stormwater ponding at locations of erosion and sediment control devices. For large areas of construction, the use of temporary detention and/or retention basins to manage the discharge of both stormwater and water pumped from excavations would be considered. Additionally, no staging or waste stockpile areas would be placed within 100-year floodplain areas. A flood contingency plan would be prepared for the project describing how construction equipment and materials located within floodplain areas would be quickly mobilized and removed from the flood zone, and how the site would be stabilized in advance of a pending storm event. In addition, temporary water diversion structures such as coffer dams at locations of in-water work would be minimized to the extent practicable to reduce temporary hydraulic impacts within floodplains.

The extent and duration of potential construction period impacts for each alternative would be relative to the number of locations where floodplains and/or floodways would be disturbed. Under Alternative 1A, floodplains would be disturbed at two locations for a total of 0.2 acres. Under Alternative 1B, floodplains would be disturbed at four locations for a total of 2.6 acres. Under Alternative 2, floodplains would be disturbed at eight locations for a total of 4.4 acres. Under Alternative 3, floodplains would be disturbed at nine locations for a total of 9.3 acres. Potential construction period impacts would be avoided or minimized by use of mandatory BMPs to reduce impacts to hydrology, restrict storage of equipment and materials within floodplains, protect water quality, limit stormwater runoff, and prevent erosion.

Proper drainage and related BMPs would be designed and implemented for all project elements. Drainage systems at new transit stations would be designed in conformance with the *Virginia Stormwater Management Handbook* as well as with the FEMA NFIP standards. This would ensure that site runoff does not cause additional adverse flooding or indirect scour effects on adjacent or downstream lands. Adverse impacts are not anticipated to downstream lands as a result of the widening of the crossings at Thalia Creek and London Bridge Creek; however, additional study would be undertaken as the project advances.



#### 5.4.6 Indirect Effects

Proper drainage and related BMPs would be designed and implemented for all project elements. Drainage systems at new transit stations would be designed in conformance with the *Virginia Stormwater Management Handbook* as well as with the FEMA NFIP standards. This would ensure that site runoff does not cause additional adverse flooding or indirect scour effects on adjacent or downstream lands. Adverse impacts are not anticipated to downstream lands as a result of the widening of the crossings at Thalia Creek and London Bridge Creek; however, additional study would be undertaken as the project advances.

#### 5.4.7 Avoidance, Minimization, and Mitigation

As the selected improvements are more fully defined, detailed studies would be conducted to better understand the hydrology and drainage patterns and to guide the engineering design of the improvements in order to avoid potential impacts to floodplains and floodways. In the event that future studies point to adverse effects on floodplains or floodways, avoidance measures would be identified. Such measures might include reducing the size of an element (such as a parking lot), modifying its layout, and/or construction phasing. Potential avoidance and mitigation efforts related to specific aspects of the project alternatives are further discussed below.

- ~ **Waterbody Crossings:** The USACE, U.S. Coast Guard (USCG), and other applicable agency requirements and limitations for replacement of existing waterbody crossings would be adhered to during project design. The goal is to meet the USACE and other applicable federal, state, and local criteria wherever new or replacement structures are proposed along the VBTES Corridor.
- ~ **Stormwater Management:** All track, roadway, and station area stormwater management systems would be designed to eliminate the risk of increased runoff volumes. Mitigation for potential impacts due to increased impervious surfaces at all the stations, as well as for the vehicle maintenance facilities, would take the form of enhanced drainage system design. The types of improvements would vary,

depending on the type of the existing system to be replaced and the system to which new system elements would connect. Potential improvements could include the installation of deep-sump catch basins, the installation of vegetated water quality swales or ditches, the installation of a new detention/retention basins or modifications to an existing basin, improved discharge control measures, the use of pervious overflow parking areas, and the installation of buffer strips or infiltration strips.

The enhanced drainage system designs would meet the criteria for BMPs as detailed in the *Virginia Erosion and Sediment Control Handbook*, Third Edition (Virginia DCR, 1992), as well as the *Virginia Stormwater Management Handbook* (Virginia DCR, 1999). The design of all rail or roadway infrastructure improvements, such as track, bridge, and structural work, would also comply with the FEMA NFIP requirements which would further help to reduce the potential for offsite flooding impacts associated with drainage and stormwater runoff.

- ~ **Construction Period:** Construction period impacts would be minimized and avoided through the use of BMPs and in accordance with methodologies detailed in the *Virginia Stormwater Management Handbook*. A Stormwater Pollution Prevention Plan (SWPPP) would be prepared and implemented on all active construction sites at all times under each alternative. This would ensure that site runoff does not cause adverse flooding or indirect scour effects on adjacent or downstream lands. For large areas of construction, the use of detention and/or retention basins to manage the discharge of both stormwater and waters removed from excavations would be considered. Additionally, no staging areas would be placed within 100-year floodplain areas. A flood contingency plan would be prepared for the project describing how construction equipment and materials located within floodplain areas would be quickly mobilized and removed from the flood zone in advance of a pending storm event.

#### 5.4.8 Permitting

Project activities within floodplains must comply with the City of Virginia Beach Floodplain Ordinance and Site Plan Regulations, including standards for floodplain/floodway management. In addition, any proposed alteration or relocation of any channel or of any watercourse, stream, etc., would require filing a joint permit application with the USACE, the Virginia Department of Environmental Quality, and the Virginia Marine Resources Commission. Further, notification of the proposal shall be given to all affected adjacent jurisdictions, the Division of Dam Safety and Floodplain Management of the Virginia Department of Conservation and Recreation, and the Federal Insurance Administration.

### 5.5 Navigable Waterways

The VBTES Corridor crosses three navigable waterways -- Thalia Creek, London Bridge Creek, and Upper Linkhorn Bay. Each of the LRT and BRT build alternatives except for Alternative 1A would require crossing at least one of these channels.

#### 5.5.1 Legal and Regulatory Context

Navigable waters are defined by USACE as “waters which are currently used, or were used in the past, or may be susceptible to use in interstate or foreign commerce, including all waters which are subject to the ebb and flow of the tide” (33 CFR 328.3 (a)(1) and 40 CFR 230.3 (s)(1)). Navigable waterways fall under the jurisdiction of both the USCG and USACE. Federal and state laws and regulations that govern the project’s effects on navigable waterways are listed below:

- ~ **Rivers and Harbors Act Section 10 (33 U.S.C. 403):** Section 10 of the Rivers and Harbors Act prohibits the unauthorized obstruction or alteration of any navigable water of the United States. This section provides that the construction of any structure in or over any navigable water of the United States, or the accomplishment of any other work affecting the course, location, condition, or physical capacity of such waters is unlawful unless the work has been recommended and authorized by the Chief of

Engineers of the USACE.

- ~ **Rivers and Harbors Act Section 14 (33 U.S.C. 408):** Section 14 of the Rivers and Harbors Act requires permission from the USACE for the use, including modifications or alterations, of any flood control facility work built by the United States to ensure that the usefulness of the federal facility is not impaired.
- ~ **Rivers and Harbors Act, the General Bridge Act of 1946, and the Bridge Act of 1906:** Section 9 of the Rivers and Harbors Act (33 U.S.C. 401), the General Bridge Act of 1946 (33 U.S.C. 525 et seq.), and the Bridge Act of 1906 (33 U.S.C. 491 et seq.), all require the location and plans of bridges and causeways across the navigable waters of the United States be submitted to and approved by the Secretary of Homeland Security prior to construction. The purpose of these Acts is to preserve the public right of navigation and to prevent interference with interstate and foreign commerce.
- ~ **Clean Water Act (33 U.S.C. 1251 et seq.):** Section 404 (b)(1) of the CWA regulates the discharge of dredged and fill materials into wetlands and waters of the U.S.
- ~ **Virginia Marine Resources Commission (VMRC) Regulations:** The VMRC regulates activities on State-owned submerged lands, tidal wetlands, and dunes/beaches under the Code of Virginia 28.2-1200 through 1420. Most activities over, under, or on State-owned submerged lands require a VMRC permit. Submerged lands include navigable waterways, which are defined by the state as a stream that is currently, or has been historically, used as a highway for trade or travel, or which is capable of such use in its ordinary and natural condition. To meet both federal and state permitting requirements, a Joint Permit Application (JPA) may be submitted to VMRC, USACE, the Virginia Department of Environmental Quality (DEQ), and the local wetland board.



5.5.2 Methodology

Information on navigable waterways was obtained from the Virginia DEQ GIS data layers, the Chesapeake Bay Program online resources ([www.chesapeakebay.net](http://www.chesapeakebay.net)), and field survey. Information pertaining to coastal access rights (which apply to navigation and recreation on coastal waterways and their shorelines) was obtained from the Middle Peninsula Chesapeake Bay Public Access Authority (<http://www.virginiacoastalaccess.net>). In addition, coordination letters were sent to the USCG and USACE to notify them of the VBTES and to seek input relative to the presence of and potential issues related to the navigable waterways crossed by the project.

Impacts to navigable waters can result from changes to the stream channel due to new structures being placed within the channel (such as piers for bridges) that could constrict or reduce the navigable width of the existing channel, or new or reconstructed bridges over the channel that could affect existing vertical clearances during high tides. Additionally, increases in sedimentation due to project construction and subsequent operations, including those related to increased

stormwater flows, can potentially affect water depth within a navigable channel which could affect navigation over time and ultimately result in a need for future dredging. Impacts from project related stormwater runoff are discussed in greater detail in **Section 5.2**. For the purposes of this analysis, direct impacts are those that modify the clearance under the bridges or that alter the stream channel or shoreline conditions. Indirect impacts are those that result from increased sedimentation that over time could impact navigability, as well as long-term increases in boat traffic.

5.5.3 Existing Conditions

The VBTES Corridor falls almost entirely within the Chesapeake Bay Watershed. In Virginia Beach, three secondary watersheds make up the Chesapeake Bay primary watershed: the Elizabeth River, Little Creek, and the Lynnhaven River. The VBTES Corridor is within the Elizabeth River and Lynnhaven River secondary watersheds. It also crosses the northern limits of the Rudee Inlet/Owls Creek Watershed which discharges directly to the Atlantic Ocean. The primary tributaries to the Chesapeake Bay in proximity to the VBTES Corridor are the Elizabeth River, Lynnhaven

Bay, and the Linkhorn/Broad Bay system (part of the Lynnhaven River watershed). Field observation of waterways within the VBTES Corridor indicate that two of the seven streams and one bay that are crossed directly by the VBTES alternative alignments support boat travel and are subject to tidal influence and therefore meet the definition of a navigable waterway. **Table 5.5-1** and **Figure 5.5-1** identify the navigable waterways within the VBTES Corridor. Great Neck Creek, which is located near Southern Boulevard east of South Sykes Avenue and is part of the Lynnhaven River watershed, is a tidally influenced waterway; however, field investigation has determined the waterway flows through a culvert under the former NSRR ROW and therefore is not capable of supporting boat traffic.

A description of conditions at each of the crossings of navigable waters is provided below.

- ~ **Thalia Creek:** The proposed VBTES Corridor follows the path of the former NSRR ROW, crossing Thalia Creek between Constitution Drive and South Gum Street south of Virginia Beach Boulevard. The existing railroad bridge over the creek is a fixed wooden structure on

Figure 5.5-2 | View of North (Downstream) Face of the Norfolk Southern Railroad Bridge over Thalia Creek



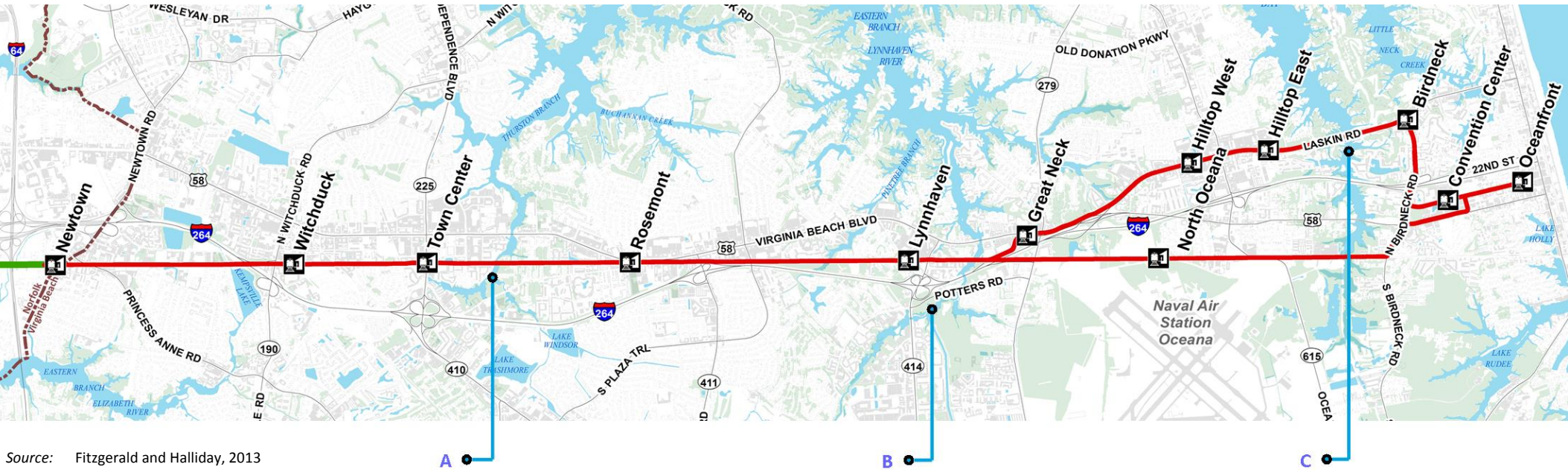
Source: Fitzgerald & Halliday, 2009

Table 5.5-1 | Navigable Waterways within the VBTES Corridor

Map Key	Waterbody Name	Approximate Location	Watershed
A	Thalia Creek	Southern Boulevard West of S. Gum Avenue	Lynnhaven River
B	London Bridge Creek	Former NSRR ROW West of Parker Lane	Lynnhaven River
C	Upper Linkhorn Bay	Laskin Road at Bayway Road	Lynnhaven River

Source: Fitzgerald and Halliday, 2013

Figure 5.5-1 | Navigable Waterways within the VBTES Corridor



Source: Fitzgerald and Halliday, 2013

wooden piles supported by concrete pile caps. The clearance at mean high tide appears to be approximately 8 feet. Based on this low clearance, only small recreational boats such as kayaks and canoes could successfully navigate under the bridge. Further limiting the clearance is an elevated 42-inch water main immediately downstream of the bridge. The latter rests on piers within the waterway (see **Figure 5.5-2**).

A review of Google Earth aerial photos (2013) revealed that there are no docks or other signs of boating activity south (upstream) of the existing railroad bridge. Downstream (north) from the existing railroad bridge, vertical clearance is controlled by the fixed bridge at Virginia Beach Boulevard. To the north of the existing railroad bridge, the first dock is encountered approximately 0.7 mile downstream on the east side of the creek opposite the athletic fields associated with Princess Anne High School. Further to the north, along the creek and into Hebden Cove and Witchduck Bay, aerial photos show docks and boating activity steadily increase. During field observations there was evidence that the existing area of the bridge crossing the creek is used for occasional recreational fishing.

~ **London Bridge Creek:** The VBTES Corridor along the former NSRR ROW crosses London Bridge Creek one

half mile east of Lynnhaven Parkway (see **Figure 5.5-3**). Similar to the Thalia Creek crossing, the existing railroad bridge across London Bridge Creek is a fixed wooden bridge supported by wooden piles and concrete pier caps. The limited clearance under the structure at high tide and the narrow width of the unobstructed openings between piers (approximately eight feet) may only be suitable for the passage of small recreational boats such as kayaks and canoes.

A review of Google Earth aerial photography (2013) revealed a single residential dock located approximately 0.5 miles to the south (upstream) of the existing railroad bridge. No other docks or signs of active boating were noted along the upstream reaches of the creek. Approximately 0.2 miles north (downstream) of the railroad bridge and just north of the Virginia Beach Boulevard bridge, docks begin to appear and steadily increase in frequency towards Lynnhaven Bay. During field observations there was evidence that the existing railroad bridge over the creek is used for recreational fishing.

~ **Upper Linkhorn Bay:** Laskin Road currently crosses Upper Linkhorn Bay just east of Bayway Road. The widest of the three crossings within the VBTES Corridor, the existing Upper Linkhorn Bay Bridge is

four lanes wide with a narrow median. Three concrete piers, each spaced approximately 30 feet apart, support the steel superstructure (see **Figure 5.5-4**). The clearance between the base of the bridge and the high water mark is approximately three feet on the north side of the bridge and two feet on its south side. The restricted clearance is only suitable for the passage of small recreational boats such as kayaks and canoes. There are a limited number of residential docks on the south (upstream) side of the bridge. Residential and commercial docks, including a marina, are prevalent north of the bridge. A Hampton Roads Sanitation District force main is located directly south of the bridge, crossing the water slightly above the level of the bridge superstructure.

one track exists under the current condition. The bridge is proposed to be approximately 100 feet longer than the existing bridge in order to span the width of the floodplain. As such, there may be beneficial impacts to this navigable waterway as the channel would be widened potentially allowing for increased boat traffic. The design of bridges in the VBTES is conceptual, and designs and quantities are subject to change in final design. See **Appendix G** for the conceptual design of the bridges.

Any bridge construction and project work at the crossing would be fully coordinated with the USACE, VMRC, and USCG to ensure that potential adverse effects to the navigation channels are avoided and minimized to the greatest extent practicable. New rail bridges would meet or exceed the navigational characteristics that are currently present on the waterway and would not cause additional hazards or impediments to navigation.

**ALTERNATIVE 2: NSRR Alternative**

The impacts to Thalia Creek under Alternative 2 would be the same as those described above for Alternative 1B. The channel would be widened, thereby resulting in potential beneficial impacts. Under Alternative 2, the bridge at London Bridge Creek would also be widened and lengthened and the channel would be widened, resulting in beneficial impacts to this navigable waterway. The exact quantities would be known in the final design. As described above for Alternative 1B, construction would be fully coordinated with the USACE, VMRC, and USCG to avoid or minimize potential adverse effects. New rail bridges would meet or exceed the navigational characteristics that are currently present on the waterway and would not cause additional hazards or impediments to navigation.

**ALTERNATIVE 3: Hilltop Alternative**

Alternative 3 would require the replacement of the bridges over Thalia Creek, London Bridge Creek, and Upper Linkhorn Bay. The impacts at Thalia Creek and London Bridge Creek would be the same as described above under Alternatives 1B and 2. As noted in the No Build alternative, the bridge over Upper Linkhorn Bay is already planned for widening. Under this alternative, the Upper Linkhorn Bay Bridge would

**Figure 5.5-3 | View of South (Upstream) Face of the Norfolk Southern Railroad Bridge over London Bridge Creek**



Source: Fitzgerald & Halliday, 2009

**Figure 5.5-4 | South (Upstream) Face of Upper Linkhorn Bay Bridge with Utilities**



Source: Fitzgerald & Halliday, 2013

**5.5.4 Environmental Impacts**

**No Build Alternative**

Under the No Build alternative, the VBTES project would not be undertaken; however, VDOT would continue with the proposed widening of Laskin Road. This would include the replacement of the bridge. As part of the first phase of the Laskin Road widening project (currently underway), VDOT is installing a subaqueous utility crossing at Linkhorn Bay. This project would eliminate the above-grade utility conduit, moving it below the bottom of the bay. The No Build alternative would not have any adverse effects on navigable waters.

**LRT Build Alternatives**

**ALTERNATIVE 1A: Town Center Alternative**

Alternative 1A does not cross or otherwise impact any navigable or potentially navigable waterways.

**ALTERNATIVE 1B: Rosemont Alternative**

Alternative 1B would require the replacement of the existing bridge over Thalia Creek. It is planned that any new bridge built at the site would have the same or higher elevation over mean high water. The bridge would be an open deck structure with wooden ties supported by piles. Steel or concrete girders may be used depending on the structural design. The bridge would be at least twice as wide as the current bridge to accommodate the two tracks; only

be replaced with a structure that may be wider than the one proposed for the No Build alternative, as Alternative 3 would accommodate six traffic lanes plus the transit guideway. It is not anticipated that the channel opening would be widened. The design of the bridges in the VBTES is conceptual, and designs and quantities are subject to change in the final design. Construction of all bridges would be fully coordinated with the USACE, VMRC, and USCG to avoid or minimize potential adverse impacts. New rail bridges would meet or exceed the navigational characteristics that are currently present on the waterway and would not cause additional hazards or impediments to navigation.

#### LRT VSMF

There are no navigable waterways on or adjacent to the LRT VSMF, so no impact is anticipated.

#### BRT Build Alternatives

All of the BRT alternatives would be located along the previously described LRT alternatives' routes and the bus maintenance area located at the same location as the LRT. Substantially similar impacts would occur along the BRT routes as described for the corresponding LRT alternatives.

### 5.5.5 Construction Impacts

Construction activities associated with all of the project build alternatives have the potential to affect stormwater runoff volumes and velocities from excavation or demolition activities. The general nature of these types of impacts is described in more detail in **Section 5.2**. The extent of construction period impacts would be relative to the number of navigable water crossings, the planned stream channel or shoreline modifications at each, and the anticipated length of time for construction.

Stringent erosion and sediment controls would be installed and maintained throughout the duration of project construction and would be kept in place until erodible areas of ground disturbance become stabilized and as determined

by the project engineer. These erosion and sediment controls would further prevent sedimentation of nearby waterways, especially during the period of active construction.

Waterways may be closed to navigation for a period of time during construction. Notices would be posted as appropriate and coordinated with the USCG. However, due to the limited number of vessels and the small size of the vessels on the waterways, this effect would be minimal.

### 5.5.6 Indirect Effects

Given that the new drainage channels associated with the project alternatives are expected to be an improvement over the existing stormwater management system and BMPs would be employed, no adverse impacts from stormwater flows and sedimentation are expected to occur. Impacts from stormwater flows are discussed in greater detail in **Section 5.2**.

### 5.5.7 Avoidance, Minimization, and Mitigation

HRT and FTA would coordinate with USACE and the USCG as the design progresses to ensure that the new bridges would not adversely impact the navigability of the VBTES Corridor waterways. The new bridges would be constructed in accordance with USCG guidelines and as required by the USACE permit issued under Section 10 of the Rivers and Harbors Act. Best management practices and containment mechanisms would be implemented during construction to avoid or minimize short-term adverse impacts to navigability. In addition, any in-water work required during project construction would be fully coordinated with the community, including scheduled temporary restrictions or closures to navigation to facilitate construction.

### 5.5.8 Permitting

It is anticipated that Alternatives 1B, 2, and 3 would require a Section 10 U.S. Rivers and Harbors Act permit or a joint permit through USACE and VMRC for crossing of navigable waters. Some of the bridge crossings associated with the build alternatives may require a USCG Section 9 Permit prior to construction. However, advanced approval letters from

the Coast Guard may be issued depending on the navigational characteristics of the waterway. Alternative 1A would not require these permits.

## 5.6 Habitat and Wildlife

The VBTES Corridor is largely developed with suburban land uses and transportation infrastructure. All of the potential wildlife habitats within the VBTES Corridor have been disturbed by human activity over time. Terrestrial habitats in and adjacent to the VBTES Corridor include grassland, shrub land, active agricultural fields, and patches of woodland. Wetland habitats are primarily disturbed emergent (non-woody) and scrub-shrub wetlands with a few small areas of forested and tidal wetlands along the creek crossings. Wildlife species using the habitats within the VBTES Corridor are common, human tolerant species that are typically found in suburban settings. No federally protected threatened or endangered species or their potential critical habitats were observed in the VBTES Corridor during field investigations in 2009 and 2013 nor are any known to occur in the VBTES Corridor according to available databases and agency coordination. In addition, no state protected species were observed in the VBTES Corridor during the field investigations and none were known to occur in the VBTES Corridor, according to available database review and agency coordination.

### 5.6.1 Legal and Regulatory Context

The following state and federal regulations address habitat and associated wildlife including protected species.

#### Federal Regulatory Programs

- ~ **Endangered Species Act of 1973 (16 U.S.C. 1531-1544):** The purpose of the federal Endangered Species Act of 1973 (ESA) is to protect and recover imperiled species and the ecosystems upon which they depend. The ESA prohibits the importation, exportation, taking, possession, and other activities involving illegally taken species covered under the Act, and interstate or foreign commercial activities. Under the ESA, species may be listed as either endangered or threatened. "Endangered" means a species is in danger of extinction throughout all or a significant portion of its range. "Threatened" means a species is likely to

become endangered within the foreseeable future. ESA Endangered and Threatened species will be referred to as ESA protected species in this chapter. The Act also provides for the protection of designated critical habitats on which endangered or threatened species depend for survival. Under the ESA "critical habitat" is defined as:

*Specific areas within the geographical area occupied by the species at the time of listing, if they contain physical or biological features essential to conservation, and those features may require special management considerations or protection; and specific areas outside the geographical area occupied by the species if the agency determines that the area itself is essential for conservation.*

The Act is administered by the US Fish & Wildlife Service (USFWS) and the National Oceanographic and Atmospheric Administration's (NOAA) National Marine Fisheries Service (NMFS). The USFWS has primary responsibility for terrestrial and freshwater organisms, while the responsibilities of NMFS are mainly marine wildlife such as whales, sea turtles, and other listed marine species.

- ~ **Bald and Golden Eagle Protection Act (16 U.S.C. 668):** In 2007 the bald eagle was delisted under the ESA. However, the bald eagle is still given legal protection under the Bald and Golden Eagle Protection Act. The Bald and Golden Eagle Protection Act prohibits anyone without a permit issued by the Secretary of the Interior from taking bald or golden eagles, including their parts, nests, or eggs. The Act defines "take" as "pursue, shoot, shoot at, poison, wound, kill, capture, trap, collect, molest, or disturb."
- ~ **Migratory Bird Treaty Act (16 U.S.C. 703-712):** The Migratory Bird Treaty Act (MBTA) implements various treaties and conventions between the U.S. and Canada, Japan, Mexico, and the former Soviet Union for the protection of over 800 species of migratory birds. The MBTA makes it unlawful to pursue, hunt, take, capture, kill, or sell any part of the species of migratory birds listed. The MBTA was first enacted in 1916 in an era when many bird species were



threatened by commercial trade in birds and bird feathers. Subject to limitations in the MBTA, the Secretary of the Interior may adopt regulations determining the extent to which, if at all, hunting, taking, capturing, killing, possessing, selling, purchasing, shipping, transporting, or exporting of any migratory bird, part, nest, or egg would be allowed, having regard for temperature zones, distribution, abundance, economic value, breeding habits, and migratory flight patterns. Birds protected under the MBTA are not necessarily rare and generally include all species native to the United States or its territories, which are those that occur as a result of natural biological or ecological processes. Birds not included on the MBTA species list are nonnative species whose occurrences in the United States are solely the result of intentional or unintentional human-assisted introduction (e.g., European starling, house sparrow, monk parakeet).

~ **The Magnuson-Stevens Fishery Conservation and Management Act (MSFCMA) (16 USC 1801 et seq.):** MSFCMA set forth the Essential Fish Habitat (EFH) provisions to identify and protect important habitats of federally managed marine and anadromous fish species. EFH is broadly defined to include "those waters and substrate necessary to fish for spawning, breeding, feeding, or growth to maturity." The Act requires the National Marine Fisheries Service (NMFS) and the Regional Fishery Management Councils (the Mid-Atlantic Fishery Management Council for the VBTES project) to describe and identify the essential habitat for the managed species, minimize to the extent practicable adverse effects on EFH caused by fishing, and identify other actions to encourage the conservation and enhancement of EFH. Adverse impacts to EFH, as defined in 50 CFR 600.910(A), include any impact that reduces the quality and/or quantity of EFH. Adverse impacts may include:

- ~ Direct impacts such as physical disruption or the release of contaminants;
- ~ Indirect impacts such as the loss of prey or reduction in the fecundity (number of offspring produced) of a managed species; and,

- ~ An analysis of the direct, indirect, and synergistic impacts as a result of the activities in the project area.

### State Regulatory Program

Under provisions of the federal ESA, all states were granted authority to create their own endangered species protection policies. The Virginia Department of Game and Inland Fisheries (VDGIF) and the Virginia Department of Agriculture and Consumer Services (VDACS) are responsible for administering and enforcing Virginia's endangered species regulations. The Virginia Department of Conservation and Recreation (VDCR) Division of Natural Heritage (DNH) produces an inventory of Virginia's natural resources and maintains a data bank of threatened and endangered species information as well as ecologically significant sites. The VDCR DNH represents VDACS by providing comments regarding potential impacts of projects on state-listed threatened and endangered plant and insect species. The VDCR DNH has no legal enforcement authority, and it serves only in an advisory role.

### 5.6.2 Methodology

The ecological communities (habitats) that occur within the VBTES Corridor were assessed during field work conducted during the weeks of September 7-11 and November 2-6, 2009 as well as during the weeks of April 15-19 and September 9-11, 2013. The field surveys were conducted to characterize the habitats within the VBTES Corridor as well to determine if any rare, unique, or critical habitat for protected species is present. Staff conducting wetland identification and other field work made general observations about habitat types in the VBTES Corridor and noted wildlife species when encountered.

The identification of habitat areas was performed using aerial photography interpretation with additional reference from the USFWS NWI mapping. Observations made by scientists during field work in 2009 and 2013 were also used as a means of verifying habitat type. In quantifying impacts to habitat, direct permanent impacts were assumed to have the potential to occur within the future ROW, at the station sites, and at the vehicle storage and maintenance facility

(VSMF). Construction impacts were assumed to occur outside of the ROW but within the identified limit of disturbance (LOD). Areas with existing development, including buildings, roadways, parking lots, and the existing single track along the former NSRR ROW, were not included in determining habitat impacts. Habitat calculations would be further refined as the design advances.

The potential for threatened and endangered species or critical habitat for protected species to occur within the VBTES Corridor was assessed through written consultation with the applicable regulatory agencies and through database review. Regulatory agencies that were contacted include USFWS, NOAA/NMFS, VDGIF, and VDCR DNH. The response letters from the regulatory agencies are included in **Appendix E**.

Applicable database searches and online reviews for protected species within the vicinity of the VBTES Corridor were also conducted. According to an online search of the VDCR natural heritage database, none of the habitats that are present in the VBTES Corridor are considered ecologically significant sites. Based on the results of the USFWS online project review process, there are no areas that are designated as critical habitat in the VBTES Corridor. The results of the agency coordination and database searches for federal and state listed species are discussed for the entire VBTES Corridor in **Section 5.6.3** following the habitat discussions by segment.

A preliminary assessment as to the potential for EFH species to occur in the four tidal creeks in the VBTES Corridor was conducted utilizing the NOAA Northeast Regional Office (NERO) habitat conservation website (<http://www.nero.noaa.gov/hcd/STATES4/VirgMary.htm>). The 10 minute by 10 minute unit area evaluated for the assessment is over 100 square miles and includes portions of the Chesapeake Bay. The database search revealed 20 EFH managed fish species in the unit area identified as part of this evaluation. The majority of the managed species are open water species that would not use tidal creeks for any part of their life cycle. The managed species that could potentially be found in the tidal creeks in the VBTES Corridor include bluefish (*Pomatomus saltatrix*),

windowpane flounder (*Scophthalmus aquosus*), scup (*Stenotomus chrysops*), and summer flounder (*Paralichthys dentatus*). The habitat characteristics for each of the four managed species as described in the individual species EFH Source Documents and by Geer (2002) were reviewed to determine the likelihood of these species occurring in the tidal watercourses in each segment.

### 5.6.3 Existing Conditions

The VBTES Corridor lies within the Tidewater region of the Middle Atlantic Coastal Plain. The topography of the VBTES Corridor is level to slightly undulating characterized by low elevation and little topographic relief. The VBTES Corridor consists of three ecologically distinct, different areas. These are: 1) the area along the former NSRR ROW, 2) city roads and adjacent parcels, and 3) the sparsely vegetated vacant parcel located north of Potters Road that is currently used by the City of Virginia Beach for various purposes.

Seven general habitat classifications were identified within the vicinity of the VBTES Corridor:

- ~ **Active Agricultural Field:** Active agriculture field habitat areas are defined for the purposes of this analysis as areas of land which are being actively maintained and utilized for growing crops and other produce.
- ~ **Woodland:** Woodland habitat areas are defined as any contiguous forested area which does not contain forested wetlands as identified in the NWI database. Woodlands are also characterized by their small size and open canopies.
- ~ **Grassland:** Grassland habitats encompass a wide range of field/meadow conditions (non-agricultural in nature) as well as manicured/maintained urban/suburban lawn grass areas. Almost all of the grassland habitats are managed with at least annual mowing.
- ~ **Shrubland:** Shrublands are defined as open space areas that are not forested or maintained and can contain small shrubs, bushes, and saplings. These habitats are generally located along the edges or transition zones of different habitat classifications.

- ~ **Forested Wetland Habitat:** Forested wetland habitat areas consist of forested areas which have been indicated on the NWI mapping or were confirmed by field observations. These habitat areas are wetlands that are dominated by trees and saplings.
- ~ **Scrub – Shrub and Emergent Wetland Habitat:** Scrub-shrub and emergent wetland habitat areas consist of non-forested wetland areas dominated by shrubs, saplings, and herbaceous plants and which have been indicated on the NWI mapping.
- ~ **Tidal Wetland Habitat:** Tidal wetland habitat areas are located along tidally influenced waterways which are indicated on the NWI mapping as estuarine and along the project extents confirmed by field observations. They typically include wetlands dominated by emergent plants.

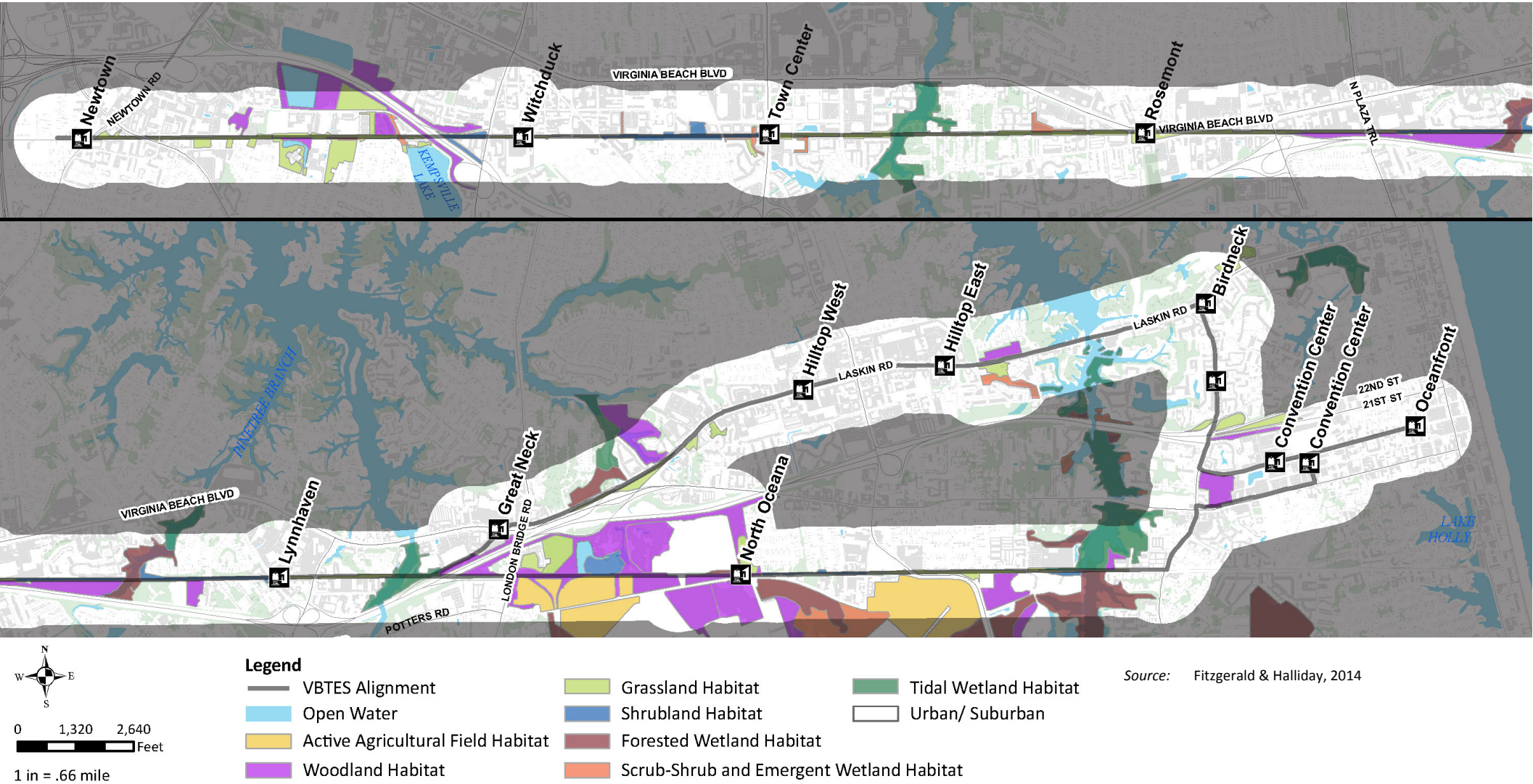
The general habitat areas are depicted on **Figure 5.6-1**. Smaller habitat areas, such as many of the smaller distinct wetlands identified along the VBTES Corridor, have been combined for graphical purposes with larger habitat areas in the figure.

Newtown Road Station to the Town Center Station along the former NSRR ROW (Alternatives 1A, 1B, 2, and 3)

Terrestrial Species and Habitat

This portion of the VBTES Corridor runs along the former NSRR ROW. The areas adjacent to, but outside of, the VBTES Corridor are largely developed. In addition, there are areas of habitat that include managed grasslands and small woodland areas. The VBTES Corridor and adjacent areas are vegetated with a mix of herbaceous and woody species that are typical of disturbed urban areas. Observed species include multiflora rose (*Rosa multiflora*), Persian silk, (*Albizia julibrissin*), Japanese honeysuckle (*Lonicera japonica*), common reed (*Phragmites australis*), white clover (*Trifolium repens*), common mullein (*Verbascum thapsus*) and mugwort (*Artemisia vulgaris*). Multiflora rose, common reed, Japanese honeysuckle, and mugwort are considered invasive alien plant species in Virginia. Wetland communities are predominantly linear emergent and scrub-shrub wetlands that are vegetated with a mix of native and

Figure 5.6-1 | General Habitat Areas



non-native herbaceous and woody species. See **Section 5.4** for further discussion of wetland communities.

Species that use the small blocks of habitat available in this portion of the VBTES Corridor are human tolerant and typical of suburban/urban settings. These species are considered habitat generalists rather than habitat specialists because of their use of the limited vegetative cover and general isolation from larger wildlife corridors. Common species in these types of habitats include raccoon (*Procyon lotor*), gray squirrel (*Sciurus carolinensis*), Virginia

opossum (*Didelphis virginiana*), eastern cottontail (*Sylvilagus floridanus*), groundhog (*Marmota monax*), white-footed mouse (*Peromyscus leucopus*), mourning dove (*Zenaida macroura*), Carolina wren (*Thryothorus ludovicianus*), American robin (*Turdus migratorius*), blue jay (*Cyanocitta cristata*), gray catbird (*Dumetella carolinensis*), northern mockingbird (*Mimus polyglottos*), European starling (*Sturnus vulgaris*), song sparrow (*Melospiza melodia*), northern cardinal (*Cardinalis cardinalis*), common grackle (*Quiscalus quiscula*), house finch (*Carpodacus mexicanus*), American goldfinch (*Spinus tristis*), and house

sparrow (*Passer domesticus*). No ESA protected species or state listed threatened or endangered species or their critical habitats were observed within this segment of the former NSRR ROW. Most of the avian species either observed or expected to occur in the VBTES Corridor are protected under the MBTA; however, they are generally common species.

*Aquatic Species and Habitat*

The VBTES Corridor crosses a very small unnamed perennial creek that is located to the west of the Greenwich Road crossing. This small freshwater creek is contained in a culvert under the former NSRR ROW and flows south into the northwest corner of Kempsville Lake. The creek is channelized, and the bed and banks primarily consist of rip-rap.

#### Town Center Station to the Rosemont Station along the former NSRR ROW (Alternatives 1B, 2, and 3)

*Terrestrial Species and Habitat*

The terrestrial habitats from the Town Center Station to the Rosemont Station are similar to the Newtown Road Station to Town Center Station segment described above. Likely species are human tolerant and typical of urban/suburban settings.

*Aquatic Species and Habitat*

The primary perennial water course crossing this segment is the tidally influenced portion of Thalia Creek. Measuring the typical channel width, the creek is approximately 75 feet wide at the former NSRR ROW. There are some wider tidal marsh areas both upstream and downstream, but the area of tidal marsh vegetation at the crossing is relatively narrow. The shoreline and open water area in Thalia Creek provides habitat for a number of shorebirds such as snowy egret, American egret, great blue heron, and osprey. Based on the water quality data provided in Sisson, et. al. (2010), the salinity of Thalia Creek in the vicinity of the former NSRR ROW crossing ranges from 1 part per thousand (ppt) to 18 ppt with an average of approximately 10 ppt.

Review of the habitat requirements for bluefish (*Pomatomus saltatrix*) in the EFH Source Document (Shepherd and Packer, 2006) and Geer (2002) indicates that juvenile bluefish usually occur at salinities greater than 16 ppt but can tolerate salinities as low as 3 ppt. Adult bluefish occur in the open ocean, large embayments and most estuarine systems with salinities greater than 29 ppt.

Therefore, adult bluefish are unlikely to occur in Thalia Creek in the vicinity of the former NSRR ROW crossing; however, juvenile bluefish could be present. Juvenile and adult windowpane flounder (*Scophthalmus aquosus*) are found in bottom habitats consisting of a mud or fine-grained sand substrate around the Gulf of Maine, on Georges Bank, southern New England, and the middle Atlantic south to Cape Hatteras at depths from 1 to 100 meters and salinities between 5.5 ppt to 36 ppt (Chang et. al., 1999). Therefore, juvenile and adult windowpane flounder could occur in Thalia Creek in the vicinity of the former NSRR ROW crossing. Adult and juvenile scup (*Stenotomus chrysops*) are commonly found from the intertidal zone to depths of about 30 meters in portions of bays and estuaries where salinities are above 15 ppt (Steimle et. al., 1999) but are rarely captured in Chesapeake Bay tributaries (Geer, 2002). Therefore, scup are not likely to occur in Thalia Creek in the vicinity of the former NSRR ROW crossing. Adult and juvenile summer flounder (*Paralichthys dentatus*) are well distributed throughout the Chesapeake Bay and its tributaries and appear to prefer a salinity of above 15 ppt (Geer, 2002). Although the salinity of Thalia Creek in the vicinity of the former NSRR ROW crossing is not optimal for summer flounder, this species could potentially occur there.

#### Rosemont Station to East of London Bridge Creek along the former NSRR ROW (Alternatives 2 and 3)

*Terrestrial Species and Habitat*

The terrestrial habitats from Rosemont Station to just east of London Bridge Creek are similar to the Newtown Road Station to Town Center and Town Center to Rosemont Station segments described above. Likely species are human tolerant and typical of urban/suburban settings.

*Aquatic Species and Habitat*

Within this segment of the VBTES Corridor there are water crossings of Pinetree Branch and London Bridge Creek. There are areas of suburban development in the vicinity of both of the creeks, but there are also naturally vegetated areas along the creek banks that consist of a mix of native, non-native, and invasive species. The former NSRR ROW crosses Pinetree Branch in the upper portion of this tidally influenced creek. Pinetree Branch is a very small creek that

is contained in a culvert under the former NSRR ROW. There is a fringe of forested wetlands along Pinetree Branch at the crossing. London Bridge Creek is tidally influenced, and it is approximately 115 feet wide where it is crossed by the former NSRR ROW due to an embankment that extends into the floodplain. Immediately south of the bridge, the creek is about 200 feet wide; immediately north, it is about 150 feet wide. There is a narrow fringe of saltmarsh vegetation along the shoreline of London Bridge Creek at the crossing. The shoreline and open water area in London Bridge Creek provides habitat for a number of shorebirds such as snowy egret, American egret, great blue heron, and osprey. Long-term salinity data collected by the VDEQ at a station approximately 0.5 mile upstream of the former NSRR ROW crossing of London Bridge Creek indicates an average salinity of 10.0 ppt (USACE, 2013). Based on the habitat descriptions for the EFH managed species identified previously, there is the potential for juvenile bluefish and juvenile and adult windowpane flounder to occur in London Bridge Creek at the former NSRR ROW crossing.

#### East of London Bridge Creek to the Oceanfront Station via NSRR ROW – Birdneck Road – 17<sup>th</sup> Street – 19<sup>th</sup> Street (Alternative 2)

*Terrestrial Species and Habitat*

The terrestrial habitats between the area east of London Bridge Creek and Birdneck Road along the former NSRR ROW are similar to those found along other parts of the VBTES Corridor except for some agricultural fields and a small area of woodland east of London Bridge Road. The woodlands and agricultural habitats adjacent to this portion of the former NSRR ROW have a greater variety of wildlife species than other parts of the VBTES Corridor. However, the woodlands in this area are relatively small and would not support forest dwelling bird species that require large blocks of unbroken forest. A description of habitat and species at the proposed vehicle storage and maintenance facility site is also included in this section.

Between Birdneck Road and the Oceanfront Station, the VBTES Corridor runs through the median or along the edges of city streets in a developed landscape.

*Aquatic Species and Habitat*

Great Neck Creek is the only watercourse in this segment. This small creek passes under the ROW in a corrugated metal culvert. Given the small size of the creek at the former NSRR ROW crossing, it is highly unlikely that EFH species are present. Forested and emergent wetlands containing both native and non-native species are adjacent to the ROW near the culvert. The emergent wetlands along Great Neck Creek are dominated by the invasive grass common reed (*Phragmites australis*). See Section 5.4 for additional information on the wetlands associated with this watercourse crossing.

#### East of London Bridge Creek to the Oceanfront Station via Laskin Road - Birdneck Road - 19<sup>th</sup> Street (Alternative 3)

*Terrestrial Species and Habitat*

Between the area east of London Bridge Creek and the Oceanfront on Laskin Road, Birdneck Road, and 19<sup>th</sup> Street, the VBTES Corridor follows city streets. Species that utilize the limited habitats along the city streets are species that are human tolerant and typically found in suburban/urban settings.

*Aquatic Species and Habitat*

The only significant water crossing within this segment of the VBTES Corridor is at Upper Linkhorn Bay. Measuring the typical channel width from the north side of the bridge, the water body is approximately 100 feet wide at the location of the VBTES Corridor crossing. The bay widens significantly north and south of the existing bridge. There is a narrow fringe of salt marsh vegetation along the shoreline that includes smooth cordgrass (*Spartina alterniflora*), saltmeadow cordgrass (*Spartina patens*), seaside goldenrod (*Solidago sempervirens*), and marsh elder (*Iva frutescens*) along with common reed. The shoreline vegetation and the tidal creek in this area provides habitat for a variety of vertebrate and invertebrate species that use salt marshes and their associated water bodies. The shoreline and open water area also provide habitat for a number of shorebirds such as snowy egret, American egret, great blue heron, and osprey. The average of long-term salinity data collected by



the VDEQ at a station approximately 0.5 mile north of where Laskin Road crosses Upper Linkhorn Bay is 20.7 ppt (USACE, 2013). Based on the habitat descriptions for the EFH managed species identified earlier in this section, there is the potential for juvenile bluefish, juvenile and adult windowpane flounder, and juvenile and adult summer flounder to occur in Upper Linkhorn Bay near the Laskin Road crossing.

Vehicle Storage and Maintenance Facility (VSMF)

The potential site of the LRT VSMF/BRT VSMF is located north of Potters Road on a parcel currently being utilized by the City of Virginia Beach for storage of construction debris, dredge spoils, and storm debris. The center of this parcel, where debris and other materials are actively being deposited and moved around, is highly disturbed and un-vegetated. The parcel provides little in terms of habitat for wildlife species other than potential feeding areas for migrating seed-eating avian species. However, although not observed during the field work, some species such as killdeer (*Charadrius vociferus*) have been known to use disturbed areas with a gravel substrate for breeding.

ESA Federally-listed Protected Species Assessment

The first written request for information on federally protected species under the Endangered Species Act was made to the USFWS in a letter dated December 15, 2009. At that time, the build alternatives generally followed the former NSRR ROW. The response letter from the USFWS dated March 31, 2010 indicated that no impacts to federally listed species or their designated critical habitat would occur.

An updated letter, including specifics on Alternative 3, was sent to the USFWS on May 7, 2013. A formal response letter (dated February 4, 2013) was received requesting that an online project review be conducted. The results of the online review process are included in **Appendix E**, and the resulting summary of ESA species/habitat online review table is presented in **Table 5.6-1**. The online review process was for all of Virginia Beach and not specific to the VBTES Corridor. The only ESA species that was listed as potentially occurring in Virginia Beach is the roseate tern (*Sterna*

Table 5.6-1 | Summary of Federal ESA Species/Habitat Online Review

Species/Resource Name	Conclusion	ESA Section 7 / Eagle Act Determination	Notes/Documentation
Roseate tern ( <i>Sterna dougallii dougallii</i> ) Population: northeast U.S. nesting population	Suitable habitat not present	No effect	Review of Roseate Tern Recovery Plan – Northeast Population, First Update <sup>a</sup>
Critical habitat	No designated critical habitat present in Virginia Beach	No effect	Review of Designated Fish and Mussels Critical Habitat and Buffers in Virginia map <sup>b</sup>
Bald eagle – nests	There are no bald eagle nests within one mile of the VBTES Corridor	No Eagle Act permit required	Review of The Center for Conservation Biology eagle nest locator mapping <sup>c</sup>
Bald eagle – concentration areas	VBTES Corridor does not intersect with any bald eagle concentration areas	No Eagle Act permit required	Review of USFWS bald eagle concentration area map for Virginia <sup>d</sup>

Notes:

<sup>a</sup> USFWS, 1998. Roseate Tern Recovery Plan - Northeast Population, First Update, Hadley. MA. 75 pp.

<sup>b</sup> Designated Fish and Mussels Critical Habitat and Buffers in Virginia map dated September 21, 2010 by USFWS Virginia Field Office

<sup>c</sup> The Center for Conservation Biology eagle nest locator online mapping accessed by FHI on July 11, 2013

<sup>d</sup> Determined by accessing the USFWS Virginia field office eagle concentration areas map tool on July 11, 2013

Source: Online ESA review process from the USFWS Virginia field office conducted by Fitzgerald & Halliday on July 11, 2013

In addition to research and consultation on the presence of terrestrial species, consultation was also undertaken to determine the likelihood of encountering aquatic species. As noted above, there are four tidally influenced waterways within the VBTES Corridor. A written request for information on protected species under the jurisdiction of the NMFS within the tidally influenced waterways in the VBTES Corridor was made on May 7, 2013. The response letter from NMFS dated June 7, 2013 indicates that four species of sea turtles and the Atlantic sturgeon are known to occur in the coastal ocean and bay waters near Virginia Beach. The five species identified in the NMFS response letter along with their federal and State designations are listed in **Table 5.6-2**.

*dougallii dougallii*). Suitable breeding habitat for the roseate tern is not present in the VBTES Corridor. According to the “Roseate Tern: Northeast Population Recovery Plan” (USFWS, 1998), the roseate tern forages for small fish over shallow bays, tidal inlets, and sandbars where there is tidal current movement; they rarely feed close to shore or in marshy inlets. Therefore, the roseate tern is not anticipated to occur within the VBTES Corridor. There is no designated critical habitat in Virginia Beach. In addition, there are no bald eagle nests or bald eagle concentration areas within one mile of the VBTES Corridor that would require obtaining an Eagle Act permit. Based on the results of the online review process, review and response by the USFWS Virginia Field Office is not necessary for this project.

The response letter from the NMFS indicates that the four species of sea turtles listed in **Table 5.6-2** occur seasonally

Table 5.6-2 | NMFS ESA Listed Species Potentially Occurring in the Coastal Ocean and Bay Waters near Virginia Beach

Common Name	Scientific Name	Federal Status	State Status
Loggerhead sea turtle- NWA DPS1 <sup>a</sup>	<i>Caretta caretta</i>	Threatened	Threatened
Leatherback sea turtle	<i>Dermochelys coriacea</i>	Endangered	Endangered
Kemp’s ridley sea turtle	<i>Lepidochelys kempii</i>	Endangered	Endangered
Green sea turtle	<i>Chelonia mydas</i>	Endangered	Threatened
Atlantic sturgeon- Chesapeake Bay DPS <sup>b</sup>	<i>Acipenser oxyrinchus oxyrinchus</i>	Endangered	Endangered

Notes:

Source: Response letter from NMFS to Fitzgerald & Halliday, June 7, 2013

<sup>a</sup> NWA DPS = Northwest Atlantic (NWA) distinct population segment (DPS), the only loggerhead DPS present in the project area

<sup>b</sup> other DPSs for Atlantic sturgeon include Gulf of Maine, New York Bight, Carolina and South Atlantic

(April 1 to November 30) in the coastal waters of the Mid-Atlantic and move into estuarine areas such as the Chesapeake Bay and its tidal tributaries to forage. However, the response letter also states that sea turtles are much more common in Atlantic Ocean waters off Virginia than they are in its coastal bays and tidal creeks and, as a result, the four species listed in **Table 5.6-2** are unlikely to occur in the four tidally influenced waterways within the VBTES Corridor.

The Chesapeake Bay Distinct Population Segment (DPS) of the Atlantic sturgeon (*Acipenser oxyrinchus oxyrinchus*) was listed as endangered in 2012 and is also included in **Table 5.6-2**. The NMFS response letter states that currently there are no records of this species in any of Virginia Beach's tidal creeks, including those within the VBTES Corridor. However, Atlantic sturgeon are known to use the nearby Chesapeake Bay as well as suitable coastal and marine habitats for feeding. The NMFS response letter also states that only sub-adult and adult sturgeon are expected to occur in coastal and marine waters near the VBTES Corridor; eggs, larvae, and juveniles are not expected to occur near the VBTES Corridor.

State-listed Species Assessment

A written request for information on protected species within the VBTES Corridor was initially made to the VDCR DNH on December 15, 2009. At that time, Alternative 3 was not under consideration. The response letter from the VDCR dated January 14, 2010 indicated that they did not anticipate the project would adversely impact natural heritage resources.

A second consultation letter, including Alternative 3, was submitted to the VDCR DNH on June 18, 2013. A response letter from VDCR dated August 26, 2013 indicated that although natural heritage resources are documented for the Kempsville and Virginia Beach quadrangles, due to the scope of the activity and distance to the resources, VDCR did not anticipate that the project would adversely impact these natural heritage resources.

In addition to written consultation, an online search of the VDCR natural heritage database was conducted. The VDCR natural heritage database search criteria included known

records of all plant and animal species that are federally- or state-listed in Virginia Beach. The results of the database search are summarized in **Table 5.6-3**. The database search resulted in known records of seven species of animals that are either federally- or state-listed threatened or endangered species within the City of Virginia Beach. In addition to the animal species listed as threatened or endangered, four vascular plants and one insect that are federally-listed as species of concern (SOC) were noted to be present in Virginia Beach. Unlike species listed as threatened or endangered, SOC is not a regulatory category and these species are given no additional legal protection.

The VDCR Natural Heritage Data Explorer lists species occurrence by county or city. It therefore lists species for all of the City of Virginia Beach and not specifically the VBTES Corridor. Many protected species are rare due to specialized habitat requirements, and they are typically less disturbance tolerant. None of the state listed species identified for Virginia Beach are typically found in highly developed urban areas such as the VBTES Corridor. The majority of the VBTES Corridor consists of suburban/urban areas along the inactive rail line and city roads. Most habitats within the VBTES Corridor are highly disturbed and consist of a mix of commercial, industrial, and residential land uses with only scattered areas of natural vegetation in

small plots. Therefore, it is very unlikely that any of the protected species listed on **Table 5.6-3** would be found to occur in the VBTES Corridor.

A written request for information on protected species within the VBTES Corridor was also made to the VDGIF on June 18, 2013. The response letter dated June 27, 2013 states that due to staffing limitations, they are unable to review pre-applications or scoping documents.

5.6.4 Environmental Impacts

No Build Alternative

Under the No Build alternative, there would be no construction or disruption of habitats within the former NSRR ROW or additional disruption at the City of Virginia Beach site on Potters Road. However, the Laskin Road widening would still be undertaken. The majority of the Laskin Road widening would take place in developed areas and would impact habitats that are currently highly disturbed and of little value. There are no known critical habitats or listed species in the vicinity of this road-widening project; therefore, it is not anticipated that widening Laskin Road would affect protected species. The Laskin Road widening project would require the replacement of the bridge over Upper Linkhorn Bay; however, BMPs would be employed to avoid or minimize impacts to aquatic species. In conclusion, there would be no adverse impacts to habitat as the result of the No Build alternative.

LRT Build Alternatives

ALTERNATIVE 1A: Town Center Alternative

During construction of Alternative 1A, all of the existing vegetation within the LOD, including at the proposed Park & Ride lots, would be removed. Based on habitat mapping developed with aerial photography, the direct LOD for Alternative 1A include 11 acres of grasslands (the majority of which are maintained lawns), five acres of shrub land, and one acre of woodland. Based on the field identification, approximately four acres of wetlands would also be impacted under Alternative 1A. Impacts to wetlands are discussed further in **Section 5.4**.

Table 5.6-3 | Results of VDCR Natural Heritage Data Explorer Search for State Listed Species within Virginia Beach

Common Name	Scientific Name	Species Type	Federal Status	State Status
Eastern big-eared bat	<i>Corynorhinus rafinesquii macrotis</i>	Mammal	None	Endangered
Dismal swamp southeastern shrew	<i>Sorex longirostris fisheri</i>	Mammal	None	Threatened
Barking treefrog	<i>Hyla gratiosa</i>	Amphibian	None	Threatened
Loggerhead sea turtle	<i>Caretta caretta</i>	Reptile	Threatened	Threatened
Canebrake rattlesnake	<i>Crotalus horridus (coastal plain population)</i>	Reptile	None	Endangered
Chicken turtle	<i>Deirochelys reticularia</i>	Reptile	None	Endangered
Eastern glass lizard	<i>Ophisaurus ventralis</i>	Reptile	None	Threatened
Brimley's assassin bug	<i>Pnironthis brimleyi</i>	Insect	SOC	None
Blue witch grass	<i>Dichanthelium caeruleascens</i>	Vascular plant	SOC	None
Florida thoroughwort	<i>Eupatorium anomalum</i>	Vascular plant	SOC	None
Long Beach seedbox	<i>Ludwigia brevipes</i>	Vascular plant	SOC	None
Virginia least trillium	<i>Trillium pusillum var. virginianum</i>	Vascular plant	SOC	None

Source: VDCR Natural Heritage Data Explorer search conducted by Fitzgerald & Halliday on July 18, 2013

The impacts reported above for Alternative 1A would occur mainly as narrow, linear disruptions to adjacent habitats. Much of this habitat is maintained lawn area which has little value for wildlife species. Other impacts to habitats such as wetlands would also occur as narrow impacts to long, linear wetland features with low value. There are no larger areas of wetland systems that would be impacted.

Any wildlife that uses the habitats along the former NSRR ROW and within the areas identified for future Park & Ride lots would be displaced. However, these species are generally human tolerant and would likely relocate to adjacent properties with similar habitat. Furthermore, various stormwater management facilities proposed as part of the VBTES project, such as grass-lined ditches and ponds, would re-establish some habitat area in the VBTES Corridor. Thus, impacts to habitats and wildlife are anticipated to be minimal and would not adversely affect regional populations.

Based on the results of coordination with state and federal regulatory agencies, as discussed in **Section 5.6.3**, and field work within the VBTES Corridor, it is very unlikely that any federally or state listed species occur in the VBTES Corridor. Further, there are no known occurrences of critical habitats or listed species observations in the VBTES Corridor. Thus, there would be no long-term adverse impacts to ESA Threatened and Endangered Species, critical habitat, or state-listed species or natural heritage resources from Alternative 1A. MBTA protected bird species could be displaced during construction; however, the species anticipated to occur within the VBTES Corridor are common species that would likely temporarily relocate to adjacent habitat and return post construction. No long-term impacts are anticipated to MBTA protected species.

#### **ALTERNATIVE 1B: Rosemont Alternative**

As under Alternative 1A, during construction of Alternative 1B, all of the existing vegetation within the LOD, including at the proposed Park & Ride lots, would be removed. Based on habitat mapping developed with aerial photography, the direct LOD for Alternative 1B include 25 acres of grasslands (the majority of which are maintained lawns), five acres of shrub land, and one acre of woodland. Based on the field

identification, approximately five acres of wetlands would also be impacted under Alternative 1B. Impacts to wetlands are further discussed in **Section 5.4**.

The impacts reported above for Alternative 1B would occur mainly as narrow, linear disruptions to adjacent habitats. Much of this habitat is maintained lawn area which has little value for wildlife species. Other impacts to habitats such as wetlands would also occur as narrow impacts to long, linear wetland features with low value. Several areas of larger wetland systems would also be impacted; however, the impacts would occur along the edge of these wetlands and would not impact the overall value or integrity of the larger wetland area. Any wildlife that uses the habitats along the former NSRR ROW and within the areas identified for future Park & Ride lots would be displaced. However, these species are generally human tolerant and would likely relocate to adjacent properties with similar habitat. Furthermore, various stormwater management facilities proposed as part of the VBTES project, such as grass-lined ditches and ponds, would re-establish some habitat area in the VBTES Corridor. Thus, impacts to habitats and wildlife are anticipated to be minimal and would not adversely affect regional populations.

Alternative 1B has the potential to impact the aquatic habitat and resources associated with the crossing of Thalia Creek through increased stormwater runoff from an increase in impervious surfaces. However, BMPs would be employed to improve stormwater quality and reduce flows, thereby avoiding or minimizing impacts. BMPs could include the employment of retention basins, filter strips, and grass-lined swales. In addition, a Stormwater Management Plan, including an Erosion and Sediment Control Plan, would be submitted to the City of Virginia Beach, and the City's design specifications for development within resource protection areas would be followed. This would ensure the design meets City and state requirements for stormwater control and water quality. A detailed discussion on potential water quality impacts is presented in **Section 5.2**.

Based on the results of coordination with state and federal regulatory agencies, as discussed in **Section 5.6.3**, and field work within the VBTES Corridor, it is very unlikely that any federally or state listed species occur in the VBTES Corridor.

Further, there are no known occurrences of critical habitats or listed species observations in the VBTES Corridor. Thus, there would be no long-term adverse impacts to ESA Threatened and Endangered Species, critical habitat, or state-listed species or natural heritage resources from Alternative 1B. MBTA protected bird species could be displaced during construction, however the species anticipated to occur within the VBTES Corridor are common species that would likely temporarily relocate to adjacent habitat and return post construction. No long-term impacts are anticipated to MBTA protected species.

#### **ALTERNATIVE 2: NSRR Alternative**

Under Alternative 2, habitat disturbance and impacts would be similar to those described for Alternatives 1A and 1B, only occurring along an extended VBTES Corridor with additional stations and Park & Ride facilities. In the portion of the VBTES Corridor between Birdneck Road and the Oceanfront Station, the LRT would run through the median or along the edges of city streets. Thus, impacts to habitat and species are anticipated to be less than those along the former NSRR ROW.

Based on the habitat mapping, the direct permanent impacts to terrestrial habitats within the LOD for Alternative 2 would include 39 acres of grasslands (the majority of which are maintained lawns), 14 acres of shrub land, and 13 acres of woodlands. Based on the field identification, approximately 10.5 acres of wetlands would be impacted under Alternative 2. Impacts to wetlands are further discussed in **Section 5.4**.

The impacts reported above for Alternative 2 would occur mainly as narrow, linear impacts to adjacent habitats. Much of this habitat is maintained lawn area, which has very little value for wildlife species. Other impacts to habitats such as wetlands would also occur as narrow impacts to long, linear wetland features with low value. Several areas of larger wetland systems would also be impacted; however, the impacts occur along the edge of these wetlands and would not impact the overall value or integrity of the larger wetland area. In addition to Thalia Creek, Alternative 2 would cross Pinetree Branch, London Bridge Creek, and Great Neck Creek. Potential impacts and impact

minimization measures for these watercourse crossings are similar to those discussed under Alternative 1B for Thalia Creek.

Based on the results of coordination with state and federal regulatory agencies, as discussed in **Section 5.6.3**, and field work within the VBTES Corridor, it is very unlikely that any federally or state listed species occur in the VBTES Corridor. Further, there are no known occurrences of critical habitats or ESA listed species observations in the VBTES Corridor. Thus, there would be no long-term adverse impacts to ESA Threatened and Endangered Species, critical habitat, or state-listed species or natural heritage resources from Alternative 2. MBTA protected bird species could be displaced during construction, however the species anticipated to occur within the VBTES Corridor are common species that would likely temporarily relocate to adjacent habitat and return post construction. No long-term impacts are anticipated to MBTA protected species.

#### **ALTERNATIVE 3: Hilltop Alternative**

Under Alternative 3, habitat disturbance and impacts to the area between The Tide's Newtown Road Station and London Bridge Creek would be similar to those described for Alternatives 1A, 1B, and 2. The impact to habitat along the Laskin Road corridor, Birdneck Road, and 19<sup>th</sup> Street would be minimal, due to the fact that the area is already developed with roadways, parking lots, buildings, and mowed lawns.

The impacts to terrestrial habitats within the LOD for Alternative 3 would include 37 acres of grasslands (the majority of which are maintained lawns), 12 acres of shrub land and 15 acres of woodlands. Based on the field identification, approximately nine acres of wetlands would be impacted by Alternative 3. This includes the habitat impacts of the lead track, which are the same as the impacts identified under Alternative 2 between London Bridge Creek and the proposed VSMF site.

The impacts reported above for Alternative 3 would occur mainly as narrow, linear impacts to adjacent habitats. Much of this habitat is maintained lawn area, which has very little value for wildlife species. Other impacts to habitats such as

wetlands would also occur as narrow impacts to long, linear wetland features with low value. Several areas of larger wetland systems would also be impacted; however, the impacts would occur along the edge of these wetlands, and would not impact the overall value or integrity of the larger wetland area. In addition to the watercourse crossings along the former NSRR ROW, including those at Thalia Creek, Pinetree Branch and London Bridge Creek, Alternative 3 would cross Upper Linkhorn Bay along Laskin Road. Potential impacts and impact minimization measures for Upper Linkhorn Bay are similar to those discussed for Thalia Creek in Alternative 1B above.

Based on the results of coordination with state and federal regulatory agencies, as discussed in **Section 5.6.3**, and field work within the VBTES Corridor, it is very unlikely that any federally or state listed species occur in the VBTES Corridor. Further, there are no known occurrences of critical habitats or ESA listed species observations in the VBTES Corridor. Thus, there would be no long-term adverse impacts to ESA Threatened and Endangered Species, critical habitat, or state-listed species or natural heritage resources from Alternative 3. MBTA protected bird species could be displaced during construction, however the species anticipated to occur within the VBTES Corridor are common species that would likely temporarily relocate to adjacent habitat and return post construction. No long-term impacts are anticipated to MBTA protected species.

#### LRT VSMF

The LRT VSMF site is largely clear or very sparsely vegetated with herbaceous species that are typical of vacant land that has been used to deposit fill material or for temporary storage. Many of the vegetation species present on and adjacent to the LRT VSMF site are non-native invasive species such as multiflora rose and mugwort. The perimeter of the LRT VSMF site is wooded and could be used by disturbance tolerant species that use edge habitats. The impacts of the LRT VSMF on habitats and wildlife are anticipated to be minimal.

Based on the results of coordination with state and federal regulatory agencies, as discussed in **Section 5.6.3**, and field work within the VBTES Corridor, it is very unlikely that any

federally or state listed species occur in the VBTES Corridor. Further, there are no known occurrences of critical habitats or ESA listed species observations in the VBTES Corridor. Thus, there would be no long-term adverse impacts to ESA Threatened and Endangered Species, critical habitat, or state-listed species or natural heritage resources from the LRT VSMF. MBTA protected bird species could be displaced during construction of the VSMF, however the species anticipated to occur at the VSMF site are common species that would likely temporarily relocate to adjacent habitat and return post construction. No long-term impacts are anticipated to MBTA protected species.

#### BRT Build Alternatives

All of the BRT alternatives would be located along the previously described LRT alternatives' routes. Construction of the BRT guideway would clear the same areas as that identified for the LRT modes; therefore, the habitat impacts would be similar to those described for the LRT alternatives. In addition, the BRT system would use the same site for its VSMF as that proposed for the LRT but vehicles would access the site by existing roadways.

#### 5.6.5 Construction Impacts

The project build alternatives would be constructed in developed urban areas where habitats have already been disturbed. During construction activities there is the potential for direct temporary impacts to approximately one acre of grassland and three acres of shrub land under Alternative 1A; four acres of grassland and three acres of shrub land under Alternative 1B; approximately six acres of grassland and five acres of shrub land under Alternative 2; and nine acres of grassland and four acres of shrub land under Alternative 3. However, the impacts reported above would occur mainly as narrow, linear impacts to adjacent habitats. Furthermore, much of this habitat is maintained lawn area which has very little value for wildlife species.

There is the potential for erosion and sedimentation from soil disturbance during construction to impact aquatic resources at the watercourse crossings. However, the impact potential is low due to the narrow nature of the ROW and minimal topographic slope along the VBTES Corridor. Construction BMPs and appropriate use of erosion

and sediment control devices would minimize the effects of erosion and sedimentation and the potential for water quality impacts during construction including those to EFH species. A detailed discussion of potential water quality impacts is provided in **Section 5.2**.

There is also the potential for noise-related impacts on wildlife during construction. However, due to existing high ambient noise levels and limited nature of adjacent habitat, noise-related impacts to wildlife are anticipated to be minimal. Potential air quality impacts to wildlife would be minimized by employing appropriate dust control measures during construction. Therefore, construction activities associated with the build alternatives would have minimal potential for impacts to wildlife and habitats during construction.

#### 5.6.6 Indirect Effects

Long-term stormwater impacts on aquatic resources are a potential indirect effect of the project. The potential long-term stormwater impacts would be mitigated through the implementation of an approved Stormwater Management Plan. Therefore, the build alternatives would have minimal indirect effects on aquatic habitats, including EFH species.

#### 5.6.7 Avoidance, Minimization, and Mitigation

The build alternatives follow an existing inactive railroad corridor and city roads and therefore are within areas that are currently disturbed. As a result, few opportunities for avoidance and minimization are available for the build alternatives. Additional measures to minimize impacts to habitats may be undertaken when the project design is further refined.

Mitigation along the portions of the alignments that are within the former NSRR ROW and city streets would consist of plantings in order to stabilize the areas of disturbed soil. The station areas would be landscaped and planted with a mix of non-invasive herbaceous and woody species. It is likely that human tolerant wildlife species would utilize these planted areas post construction. To the extent possible, additional native species would be planted around the perimeter of the VSMF. The use of low maintenance

native landscaping would be considered during preparation of the final landscaping designs. Additional mitigation measures for impacts to wetland habitats are discussed in **Section 5.4**.

Potential water quality related impacts during construction would be mitigated through implementation of the Erosion and Sediment Control Plan and adherence to applicable guidelines. Additionally, potential water quality impacts from the increased impervious surface area after construction would be mitigated through implementation of the approved Stormwater Management Plan. Consultation with appropriate resource agencies would be undertaken throughout the development of the final design. Through this consultation, additional mitigation measures may be identified, including stormwater management measures, potential seasonal restrictions for in-water construction, and the potential preparation of an EFH Assessment.

### 5.7 Air Quality

This section discusses the potential effects of the build alternatives on air quality. There are a number of pollutants produced by transportation sources that affect the quality of the ambient air, which is a general term for outdoor air that the public is exposed to. Air pollution refers to one or more chemical substances that degrade the quality of the atmosphere. Individual air pollutants degrade the atmosphere by reducing visibility, damaging property, reducing the productivity and vigor of crops or natural vegetation, and/or harming human and animal health.

#### 5.7.1 Legal and Regulatory Context

Under the auspices of the Clean Air Act and 1990 Clean Air Act Amendments (42 U.S.C. 7401 et seq.), federal standards have been established to define acceptable levels of certain air pollutants. The federal ambient air standards and regulatory requirements are described below.

#### Criteria Pollutants

The U.S. Environmental Protection Agency (EPA) established National Ambient Air Quality Standards (NAAQS) for six commonly found air pollutants, also called criteria pollutants. Criteria air pollutants are called such because

EPA has set standards for them based on human health-based and/or environmentally-based criteria. **Primary standards** set maximum limits to protect public health, including the health of sensitive populations such as asthmatics, children, and the elderly. **Secondary standards** are set to protect public welfare and the environment, including protection against visibility impairment, damage to animals, crops, vegetation, and buildings. With the exception of sulfur dioxide, all criteria pollutants have secondary standards that are equal to the primary standards. The six criteria pollutants are carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO<sub>2</sub>), ozone (O<sub>3</sub>), particulate matter (PM), and sulfur dioxide (SO<sub>2</sub>).

The Clean Air Act Amendments require each state to monitor air quality to determine whether the NAAQS are being met. The Virginia Department of Environmental Quality (VDEQ) enforces air quality standards identical to the NAAQS. Like other states, Virginia has established a system of air sampling stations across the state to monitor the criteria pollutants. Air sampling station results are evaluated in order to identify regions which may have air pollution problems. If air pollutant levels do not exceed the standard for any pollutant, a region is considered in attainment of the NAAQS.

However, if even one sampling location (monitor) in a region shows a pollutant level higher than the standard (called an exceedance of the standard), the region (or a portion of it) is then classified as nonattainment for that pollutant. Once a region is classified as nonattainment for an air pollutant, the state must develop a plan to bring the region back to attainment status, called a State Implementation Plan (SIP). Hampton Roads is currently in attainment for all criteria pollutants.

Mobile Source Air Toxics

In addition to the NAAQS pollutants, EPA regulates 188 air toxics. The EPA has assessed this expansive list in its final rule on the Control of Hazardous Air Pollutants from Mobile Sources (72 FR 8428), published on February 26, 2007, and identified a group of 93 compounds emitted from mobile sources that are listed in the Integrated Risk Information

System (IRIS) (<http://www.epa.gov/iris/>). In addition, EPA identified seven compounds with significant contributions from mobile sources that are among the national and regional-scale cancer risk drivers. These are acrolein, benzene, 1,3-butadiene, diesel particulate matter plus diesel exhaust organic gases (diesel PM), formaldehyde, naphthalene, and polycyclic organic matter. While the Federal Highway Administration (FHWA) considers these the priority mobile source air toxics, the list is subject to change and may be adjusted in consideration of future EPA rules.

The 2007 EPA rule on MSATs requires controls that will dramatically decrease MSAT emissions through cleaner fuels and cleaner engines.

5.7.2 Methodology

Based on the regulatory framework and the attainment air quality status in VBTES Corridor, a qualitative air quality analysis would be conducted for criteria pollutants and MSATs. Factors that influenced this determination include:

- ~ With regard to CO and PM, project-level (hot spot) analysis applies only to CO and PM nonattainment and maintenance areas (40 CFR 93.116 ). Since the VBTES Corridor is considered to be in attainment for CO and PM, a detailed quantitative analysis would not be completed for these pollutants.
- ~ For MSATs, FHWA has outlined a tiered approach for analyzing MSATs in NEPA documents, with three tiers representing the levels of potential impacts from projects (Memorandum, Interim Guidance on Air Toxic Analysis in NEPA Documents, dated February 3, 2006). The three tiers are the following:
  1. No analysis for projects with no potential for meaningful effects on MSATs (such as categorical exclusions);
  2. Qualitative analysis for projects with low potential MSAT effects (including projects that would improve transit or freight operations); and

3. Quantitative analysis to differentiate between alternatives for projects with higher potential MSAT effects (such as creating or substantially altering a major intermodal freight facility with the potential to concentrate diesel particulate matter in a single location).

Based on this guidance, the VBTES improvements would fall under the middle tier and thus require a qualitative analysis of potential MSAT effects.

5.7.3 Existing Conditions

Air Quality Trends

The VBTES area is located in the Tidewater Monitoring Region. This region serves the counties of Accomack, Isle of Wight, James City, Northampton, Southampton, and York; and the cities of Chesapeake, Franklin, Hampton, Newport News, Norfolk, Poquoson, Portsmouth, Suffolk, Virginia Beach, and Williamsburg. Any exceedance in this region would cause a portion of, or the entire region, to become classified as nonattainment for that pollutant. The region is currently in attainment of all air quality standards.

The criteria pollutants of greatest concern in transportation planning are CO, ozone, particulates, and some Mobile Source Air Toxics because they are influenced by motor vehicle activity.

5.7.4 Environmental Impacts

No Build Alternative

Under the No Build alternative, the VBTES project would not be undertaken. However, the No Build alternative considers planned transportation improvements that would be implemented by the year 2034. The HRTPO and VDOT have identified transportation improvements on Witchduck Road and Laskin Road. Improvements on Witchduck Road from I-264 to Virginia Beach Boulevard in the *Hampton Roads 2030 Amended Long-Range Transportation Plan* include the widening of Witchduck Road from four lanes (two travel lanes in each direction) to six lanes (three travel lanes in each direction). Improvements on Laskin Road will extend from 0.2 miles west of First Colonial to 0.3 miles east of

Birdneck Road. The plan is to widen the roadway and remove/re-purpose the access roadway network that runs parallel to Laskin Road. Two additional travel lanes in each direction will be provided, and the frontage roads will be eliminated. This could potentially have a positive impact on air quality because of improved operations on Witchduck Road and improved access and circulation on Laskin Road resulting in less stop-and-go traffic and its resulting emissions.

LRT Build Alternatives

The amount of pollutants emitted from the transit activity would be proportional to the transit fuel source, the total scope of transit activity, the motor vehicle miles traveled (VMT) in the area, and the location and number of stations and Park & Ride lots, assuming that other variables are the same for each alternative.

The LRT alternatives would be run on electricity and, as such, are not expected to increase criteria pollutants or MSATs in the VBTES Corridor. There can potentially be a small mode shift of travelers to transit from their cars under the LRT build alternatives. This mode shift could potentially yield a minor reduction in vehicular emissions on the region's highways based on a decrease in the number of vehicles on the roads, reduced congestion, and more constant vehicular speeds. The extent of the potential emissions reductions would correspond to the reduction in VMT and congestion associated with each alternative. Associated travel patterns, from patrons driving to the stations to park and ride the transit system and from the additional buses that would serve the stations to support the LRT, would also play a role. The on-road VMT estimates at nearby intersections are similar in the LRT build alternatives as compared to the No Build alternative. Thus, no appreciable difference in criteria pollutants and MSAT emissions from VMT and congestion at the nearby roadway intersections is anticipated among the various LRT alternatives.

Alternative 1A, with two new stations and 3.0 miles of track, could have a positive impact to air quality because of its potential to shift a small percentage of auto-related trips to transit trips in the VBTES Corridor. Similarly, Alternative 1B



with three new stations and 4.8 miles of track could also have a positive impact on air quality. Alternative 2, with 12.2 miles of track and five Park & Ride facilities, would likely have an even greater positive impact on air quality because of the additional transit corridor length, stations, and Park & Ride lots. Alternative 3, with a 13.5 mile transit system and seven Park & Ride facilities, would likely have the greatest positive impact on air quality (criteria pollutants and MSATs), however, this effect would be minimal. Due to the fact that air pollution levels are below the NAAQS, the VBTES Corridor is in attainment for all criteria pollutants. Thus, a quantitative analysis was not undertaken.

BRT Build Alternatives

All of the BRT alternatives would be located along the above described LRT alternatives’ routes. The fuel source for the BRT alternatives would be diesel. The estimated pollutants, particularly MSATs and diesel particulate matter, emitted from the BRT build alternatives would be higher than for the LRT build alternatives. Due to the length of the VBTES Corridor and the number of Park & Ride stations, Alternative 3 would have a greater effect than Alternative 2 and both of these alternatives would have a greater effect than Alternatives 1A and 1B.

Alternative 3 could have the greatest impact on air quality because it would increase diesel emissions by the greatest percentage. However, the negligible impacts of this alternative are not a cause of concern, because current levels are not in danger of exceeding the NAAQS and there is potential to reduce VMT and congestion from the region’s highways.

5.7.5 Construction Impacts

During any earth-clearing and other construction activities associated with the build alternatives, potential air quality impacts include airborne dust particles from exposed soils and emissions from idling and mobile construction vehicles. However, to minimize impacts, best management practices would be followed.

5.7.6 Indirect Effects

Because of the negligible effect to regional air quality, it is

not anticipated that any indirect air quality impact would occur with the build alternatives.

5.7.7 Avoidance, Minimization, and Mitigation

To minimize impacts during construction, the following best management practices would be followed:

- ~ Minimization of exposed erodible earth area to the extent possible.
- ~ Stabilization of exposed earth with grass, pavement, or other cover as early as possible.
- ~ Application of stabilizing agent (i.e., calcium chloride, water) to the work areas and haul roads.
- ~ Covering, shielding, or stabilizing stockpiled material as necessary.
- ~ Use of covered haul trucks.
- ~ To minimize drag out, the incidental transport of soil by construction equipment from unpaved to paved surfaces, rinsing of construction equipment with water or any other equivalent method.
- ~ Use of clean fuels including ultra-low sulfur diesel fuel (15 ppm sulfur), compressed natural gas, or emulsified fuels.
- ~ Elimination of any unnecessary idling to no more than three minutes.

5.8 Noise and Vibration

The construction and operation of the alternatives under consideration in the VBTES have the potential to increase noise and ground-borne vibration in nearby land uses. This section describes the potential effects of noise and vibration that could occur from construction of the build alternatives.

5.8.1 Legal and Regulatory Context

The FTA’s Transit Noise and Vibration Impact Assessment

report, dated May 2006, presents guidelines for predicting and assessing the impacts of noise and vibrations for proposed transit projects. These guidelines are used in the analysis of the alternatives under consideration in the VBTES.

Virginia Beach City Code Section 23-69 specifies maximum sound levels for residential buildings. However, Section 23-69(d)(8) states that public transportation is exempt from the daytime maximum sound level.

5.8.2 Methodology Noise

Noise is unwanted or undesirable sound. Sound travels through the air as waves of tiny air pressure fluctuations caused by vibration. The intensity or loudness of a sound is determined by how much the sound pressure fluctuates. For convenience, sound pressure is expressed in decibel (dB) notation. Most sounds consist of a broad range of sound frequencies, from low frequencies to high frequencies. The average human ear does not perceive all frequencies equally. Therefore, the A-weighting scale was developed to approximate the way the human ear responds

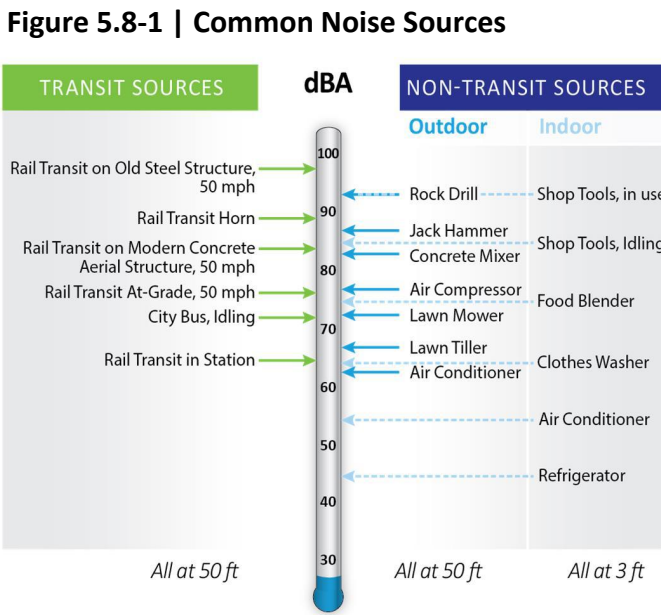
to sound levels; it mathematically applies less “weight” to frequencies humans do not hear well, and applies more “weight” to frequencies humans do hear well. Typical A-weighted noise levels for various types of sound sources are summarized in Figure 5.8-1.

The equivalent average sound level ( $L_{eq}$ ) is often used to describe sound levels that vary over time, usually a one-hour period. Using twenty-four consecutive one hour  $L_{eq}$  values, it is possible to calculate daily cumulative noise exposure. A common community noise rating is the Day-Night Average Sound Level (DNL or  $L_{dn}$ ). The  $L_{dn}$  is the 24-hour  $L_{eq}$  but includes a 10 dBA penalty on noise that occurs during the nighttime hours (between 10 p.m. and 7 a.m.) where sleep interference might be an issue. The 10-dBA penalty makes the  $L_{dn}$  useful when assessing noise in residential areas, or land uses where overnight sleep occurs such as hospitals or hotels.

The methods described in the FTA’s Transit Noise and Vibration Impact Assessment report, dated May 2006, were used as a screening process to determine the potential impacts of noise from the proposed LRT and BRT alternatives. Results from the screening are a conservative estimate of impacts, and they will be used to identify the focus of the more detailed analysis of noise impacts for the locally preferred alternative that will occur during the FEIS.

The FTA criteria for the noise assessment are based on the land use category of the building or receptor, existing noise levels, and changes in noise exposure due to the project. The approach for the analysis consisted of:

1. Identifying land use categories and locations of noise receptors along the alignments.
2. Measuring (or modeling) existing noise levels for the various land use categories and receptors.
3. Modeling the future transit operational noise exposure assuming the project is built, using the FTA noise impact assessment spreadsheet model.



Source: FTA Transit Noise and Vibration Impact Assessment report, 2006

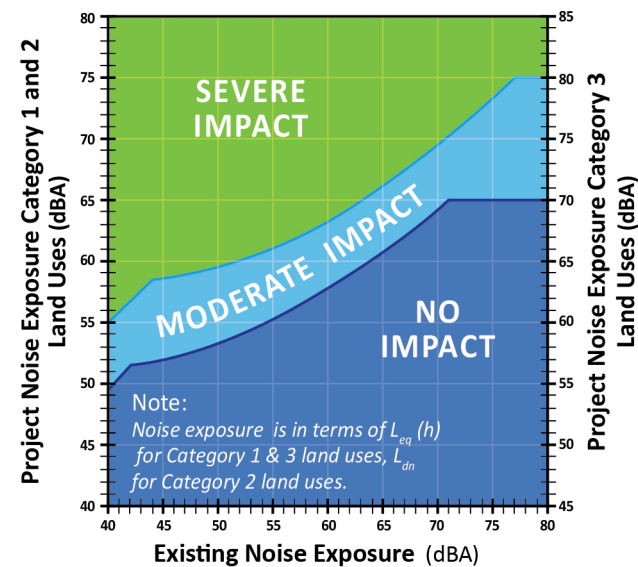
Table 5.8-1 | Noise Assessment Land Use Categories

Land Use Category	Noise Metric, dBA	Description of Land Use Category
1	Outdoor $L_{eq}(h)^*$	Tracts of land where quiet is an essential element in their intended purpose. This category includes lands set aside for serenity and quiet, and such land uses as outdoor amphitheaters and concert pavilions, as well as National Historic Landmarks with significant outdoor use. Also included are recording studios and concert halls.
2	Outdoor $L_{dn}$	Residences and buildings where people normally sleep. This category includes homes, hospitals and hotels where a nighttime sensitivity to noise is assumed to be of utmost importance.
3	Outdoor $L_{eq}(h)^*$	Institutional land uses with primarily daytime and evening use. This category includes schools, libraries, theaters, and churches where it is important to avoid interference with such activities as speech, meditation, and concentration on reading material. Places for meditation or study associated with cemeteries, monuments, museums, campgrounds, and recreational facilities can also be considered to be in this category. Certain historical sites and parks are also included.

\* $L_{eq}$  for the noisiest hour of transit-related activity during hours of noise sensitivity

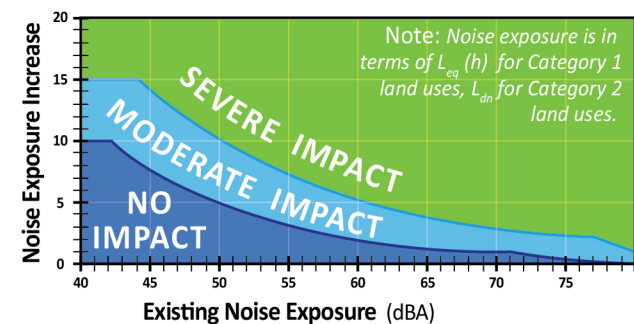
Source: FTA Transit Noise and Vibration Impact Assessment report, 2006

Figure 5.8-2 | Project Noise Impact Curves



Source: FTA Transit Noise and Vibration Impact Assessment report, 2006

Figure 5.8-3 | Cumulative Noise Impact Curves



Source: FTA Transit Noise and Vibration Impact Assessment report, 2006

4. Verifying that the model reasonably predicts the operational noise exposure.

Table 5.8-1 describes the land use categories and appropriate noise metrics.

The FTA methodology categorizes noise impacts in terms of severity—severe impact, moderate impact, and no impact. Moderate noise impacts are considered to be noticeable by most people, and severe noise impacts are considered to be an annoyance to a significant percentage of people. The equations for the moderate and severe impact curves are given in Appendix B of the FTA manual.

Figure 5.8-2 illustrates the curves used to determine noise impacts based on the land use category, existing noise levels, and project noise exposure. It presents the noise impact criteria in terms of project-related noise; the curves are based on increases in cumulative noise levels. As existing noise levels increase, the amount of additional noise necessary to impact the receptor decreases. Figure 5.8-3 illustrates how existing and cumulative noise levels are used to assess impacts.

Noise-sensitive land uses in the study area were identified three ways. First, there was a review of aerial photographs. Second, publicly available and reasonably obtainable information was used to look for special land uses (i.e. recording studios, broadcast studios, certain medical facilities, etc.). Third, a windshield survey and interviews of individuals in the study area were conducted. Additional information regarding the noise analysis methodology can be found in the Noise and Vibration Technical Report, Appendix Q.

Vibration

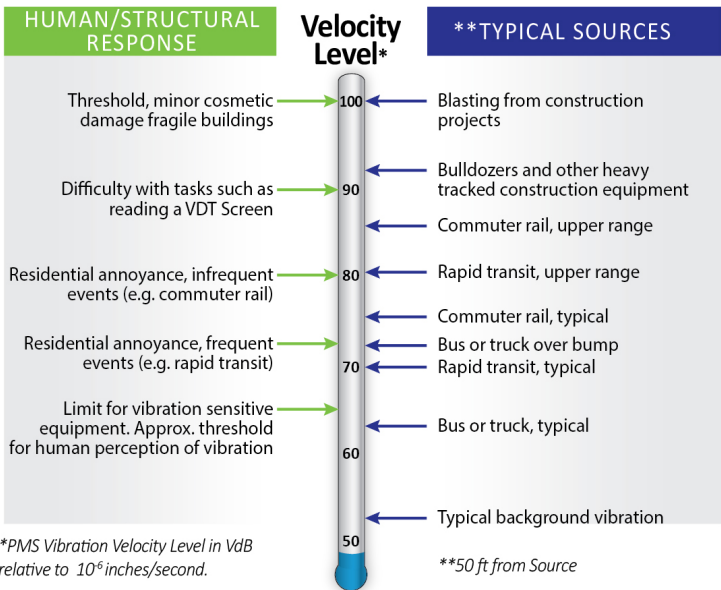
Vibration consists of rapidly fluctuating motions. However, human response to vibration is a function of the average motion over a longer (but still short) time, such as one second. The root mean square (RMS) amplitude of a motion over a one-second period is commonly used to predict human response to vibration. For convenience, decibel notation is used to describe vibration relative to a reference quantity. The FTA has adopted the notation VdB (for

vibration decibels), which is decibels relative to a reference quantity of one microinch per second ( $10^{-6}$  in/s).

Ground-borne vibration (GBV) can be a serious concern for residents or at facilities that are vibration-sensitive, such as laboratories or recording studios. The effects of ground-borne vibration include perceptible movement of building floors, interference with vibration sensitive instruments, rattling of windows, and the shaking of items on shelves or hanging on walls. Additionally, GBV can cause the vibration of room surfaces resulting in ground-borne noise (GBN). Ground-borne noise is typically perceived as a low frequency rumbling sound.

In contrast to airborne noise, ground-borne vibration is not an everyday experience for most people. The background vibration level in residential areas is usually 50 VdB or lower—well below the threshold of perception for humans, which is around 65 VdB. Levels at which vibration interferes with sensitive instrumentation, such as medical imaging equipment or extremely high-precision manufacturing, can be much lower than the threshold of human perception. Most perceptible indoor vibration is caused by sources

Figure 5.8-4 | Typical Vibration Levels



\*PMS Vibration Velocity Level in VdB relative to  $10^{-6}$  inches/second.

\*\*50 ft from Source

Source: FTA Transit Noise and Vibration Impact Assessment report, 2006

within a building such as the operation of mechanical equipment, movement of people, or slamming of doors. Typical outdoor sources of perceptible ground-borne vibration are construction equipment, steel-wheeled trains, and traffic on rough roads, though in most soils GBV dissipates very rapidly. **Figure 5.8-4** illustrates common vibration sources and the human and structural response to ground-borne vibration.

The procedure for identifying vibration-sensitive land uses in the VBTES Corridor was the same as that described for identifying noise-sensitive land uses. As with the noise analysis, this procedure is intended for screening purposes and provides conservative results, with more detailed analysis to be performed for the locally preferred alternative during the FEIS. **Table 5.8-2** describes the land use categories for vibration assessment defined in the FTA methodology.

**Table 5.8-2 | Vibration Assessment Land Use Categories**

Land Use Category/ Building Type	Description of Land Use Category
1	Buildings where vibration would interfere with interior operations
2	Residences and buildings where people normally sleep
3	Institutional land uses with primarily daytime use
Special	Concert halls, TV studios, recording studios, auditoriums, and theaters

Source: FTA Transit Noise and Vibration Impact Assessment report, 2006

The general vibration assessment considered each building individually. All buildings within the project area were screened to identify Category 2 and Category 3 buildings. Category 1 buildings and special buildings were identified on an individual basis.

The vibration impact criteria levels are based upon land use category and frequency of vibration events. The service frequencies described in the noise assessment resulted in a total number of daily LRT and BRT vibration events of 80 per direction, or 160 total events. The feeder bus service frequencies result in a total number of 36 daily vibration events.

With a total number of vibration events exceeding 70 events per 24-hour period, the LRT and BRT fall within FTA’s “Frequent Events” classification. The feeder buses fall within FTA’s “Occasional Events” classification. **Table 5.8-3** shows the relevant vibration impact criteria.

**Table 5.8-3 | Ground-Borne Vibration Impact Criteria**

Land Use Category/ Building Type	GBV Impact Levels, VdB re 1 micro-inch/sec	
	Frequent Events	Occasional Events
<b>Category 1:</b> Buildings where vibration would interfere with interior operations	65	65
<b>Category 2:</b> Residences and buildings where people normally sleep	72	75
<b>Category 3:</b> Institutional land uses with primarily daytime use	75	78
<b>Special:</b> Concert Halls, TV Studios, and Recording Studios	65	65
<b>Special:</b> Auditoriums and Theaters	72	80

Source: FTA Transit Noise and Vibration Impact Assessment report, 2006

The criteria indicate the level where a building would be considered impacted by vibrations from the transit systems. Additional information regarding the noise analysis methodology can be found in **Appendix Q**.

5.8.3 Existing Conditions Noise

For this DEIS, noise-sensitive receptors were grouped into receptor clusters per FTA guidance. A receptor cluster is a group of receptors located in close proximity to each other and the proposed transit guideway; the outdoor noise environment is assumed to be the same throughout the cluster. Existing noise levels were then measured at locations along the VBTES Corridor to offer accurate representation of the receptor clusters.

Ambient noise levels were measured at 13 locations along the former NSRR ROW from Newtown Road to Birdneck Road in July 2009. Four one-hour measurements were performed at each location, with an hour for each of the peak morning, midday, peak evening, and nighttime conditions. The calculated L<sub>dn</sub> values from these short-term measurements ranged from 61 to 76 dBA. According to American National Standards Institute (ANSI) S12.9 Part 3, an L<sub>dn</sub> of 60 dBA is typical for an urban or noisy suburban residential environment and 70 dBA is typical for a very noisy urban environment.

In September 2013, ambient noise levels were measured for a continuous 24-hour period at six additional locations along Laskin Road and Birdneck Road. The locations were determined to be representative of their surroundings based on a review of aerial photographs and a windshield survey of the study area. The measured L<sub>dn</sub> values from these 24-hour monitoring locations ranged from 69 to 77 dBA. According to ANSI S12.9 Part 3, this range of values is typical for a very noisy urban environment.

The proposed feeder bus routes were identified after field measurements were completed. AICUZ mapping for Naval Air Station Oceana was used to determine the existing noise exposures for a majority of the receptors along feeder bus routes 39 and 35 because aviation noise dominates the soundscape in these areas. Ambient noise levels were estimated for all other receptors, including those along

feeder bus route 38 and a few receptors not within the AICUZ mapping area. **Appendix Q** has additional information ambient noise conditions in the VBTES Corridor.

The existing noise exposure estimation method from the FTA manual is based upon distances from major noise sources and population densities. The FTA manual provides individual noise exposure levels based upon population density and the distances from interstate highways, other major roadways, and railroad lines. The maximum noise exposure of these four methods is then used as the existing noise exposure level for the receptor. The distances were measured using aerial photos, and population densities were identified from U.S. Census data.

The source of most existing noise in the VBTES Corridor is vehicular traffic. Aviation noise related to NAS Oceana, although intermittent, is prominent throughout the eastern part of the VBTES Corridor.

Vibration

Existing conditions data for GBV were not collected for this phase of the project, as they are not required under FTA procedures for a general vibration assessment.

5.8.4 Environmental Impacts

The impacts to noise and vibration for the Under the No Build alternative, the VBTES project would not be undertaken. Noise exposure in the VBTES Corridor would continue at the same or similar levels as the existing conditions.

No Build Alternative

Under the No Build alternative, the VBTES project would not be undertaken. Noise exposure in the VBTES Corridor would continue at the same or similar levels as the existing conditions described in **Section 5.8.3**. Noise exposure may differ from existing conditions in some locations as a result of planned transportation improvement projects, increases in aviation noise, and other changes in the area.

Table 5.8-4 | Summary of Potential LRT Build Alternative Noise Impacts by Receptors<sup>1</sup> by Land Use Category (Following FTA Methodology)

			Number of Moderate Impacts	Number of Severe Impacts
ALTERNATIVE	1A	Category 1	0	0
		Category 2	1	4
		Category 3	1	1
	1B	Category 1	0	0
		Category 2	3	7
		Category 3	1	1
	2	Category 1	0	0
		Category 2	9	18
		Category 3	2	1
	3	Category 1	0	0
		Category 2	4	16
		Category 3	2	1

<sup>1</sup>Receptors may contain more than one building.

Source: HDR, 2014

LRT Build Alternatives

Noise

Table 5.8-4 summarizes the number of receptors potentially impacted by noise for each LRT build alternative and land use category. Receptors may contain more than one building. These were determined using the FTA methodology, which is a screening-level analysis that provides conservative results. The receptors where noise impacts were identified for the LRT alternatives are listed in Table 5.8-5 (on the following page). Details showing existing and project noise levels and impact thresholds are in Appendix Q.

Vibration

The LRT build alternatives were assessed for their potential to impact adjacent uses from project related ground-borne

Table 5.8-5 | Receptors with Potentially Moderate or Severe Noise Impacts for LRT Alternatives

Receptor	Land Use Category	ALTERNATIVE				Level of Impact
		1A	1B	2	3	
R6	2	•	•	•	•	Moderate
R8	3	•	•	•	•	Severe
R9	2	•	•	•	•	Severe
R11	2	•	•	•	•	Severe
R12	2	•	•	•	•	Severe
R13	2	•	•	•	•	Moderate
R14	2	•	•	•	•	Severe
R15	2		•	•	•	Severe
R17b	2		•	•	•	Severe
R18	3		•	•	•	Severe
R21	2		•	•	•	Moderate
R22	2		•	•	•	Moderate
R27	2			•	•	Severe
R28	2			•	•	Moderate
R33	2			•	•	Moderate
R35a	2			•		Moderate
R38	2			•		Moderate
R39	3			•		Moderate
R40	2			•		Moderate
R41	2			•		Severe
R42	2			•		Moderate
R43	2			•		Severe
R48	2			•	•	Severe
R49	2			•	•	Severe
R50	2			•	•	Severe
R51	2			•	•	Severe
R52	2			•	•	Severe
R53	2			•	•	Severe
R54	2			•	•	Severe
R56	3			•	•	Severe
R62	2				•	Moderate

Source: HDR, 2014

vibration using the FTA screening-level methodology. Between Newtown Road and the proposed Town Center Station, LRT Alternatives 1A, 1B, 2, and 3 would impact 7 buildings due to vibration. Between the proposed Town Center Station and the proposed Rosemont Station, LRT Alternatives 1B, 2, and 3 would impact 3 additional residential buildings due to vibration. Between the proposed Rosemont Station and London Bridge Creek, vibration from LRT Alternatives 2 and 3 would impact 10 additional residences and one Category 1 land use. East of London Bridge Creek on both Alternatives 2 and 3, no vibration impacts are anticipated.

Table 5.8-6 provides a summary of the results of the general vibration assessment for all of the LRT alternatives. Details of the vibration analysis are in Appendix Q.

The locations of the potentially impacted buildings are shown in Figure 5.8-5 (on the following page).

BRT Build Alternatives

Noise

The FTA criteria for buses were used to estimate the effects of noise generated by the BRT build alternatives. The screening-level analysis results indicate potential for moderate noise impacts due to the BRT for all four alternatives. Table 5.8-7 shows a summary of potential noise impacts by BRT build alternative and land use category. Table 5.8-8 lists the receptors where impacts are projected to occur. Additional detail regarding the existing and projected noise levels and impact thresholds can be found in Appendix Q.

Vibration

The FTA criteria for buses were used to estimate the effects of ground-borne vibration from the BRT build alternatives. A vibration impact curve applicable to buses was used for the analysis. Based on the FTA impact criteria and screening-level analysis for this phase of development, vibration from the BRT alternatives is not predicted to impact buildings in the VBTES Corridor.

Table 5.8-6 | Summary of LRT Build Alternative Potential Vibration Impacts by Land Use Category

Land Use Category	ALTERNATIVE			
	1A	1B	2	3
Category 1	0	0	1	1
Category 2	7	10	20	20
Category 3	0	0	0	0

Source: HDR, 2014

Table 5.8-7 | Summary of Potential BRT Build Alternative Noise Impacts by Source (Following FTA Methodology)

	Category	Number of Moderate Impacts	Number of Severe Impacts
ALTERNATIVE	1A	1	0
		2	1
		3	0
	1B	1	0
		2	1
		3	0
	2	1	0
		2	2
		3	0
	3	1	0
		2	2
		3	0

Source: HDR, 2014

Table 5.8-8 | Receptors with Potential Moderate or Severe Noise Impacts for BRT Alternatives

Receptor	Land Use Category	ALTERNATIVE				Level of Impact
		1A	1B	2	3	
R6	2	•	•	•	•	Moderate
R56	2			•	•	Moderate

Source: HDR, 2014

Figure 5.8-5 | Locations of Receptors with Potentially Severe Noise Impacts

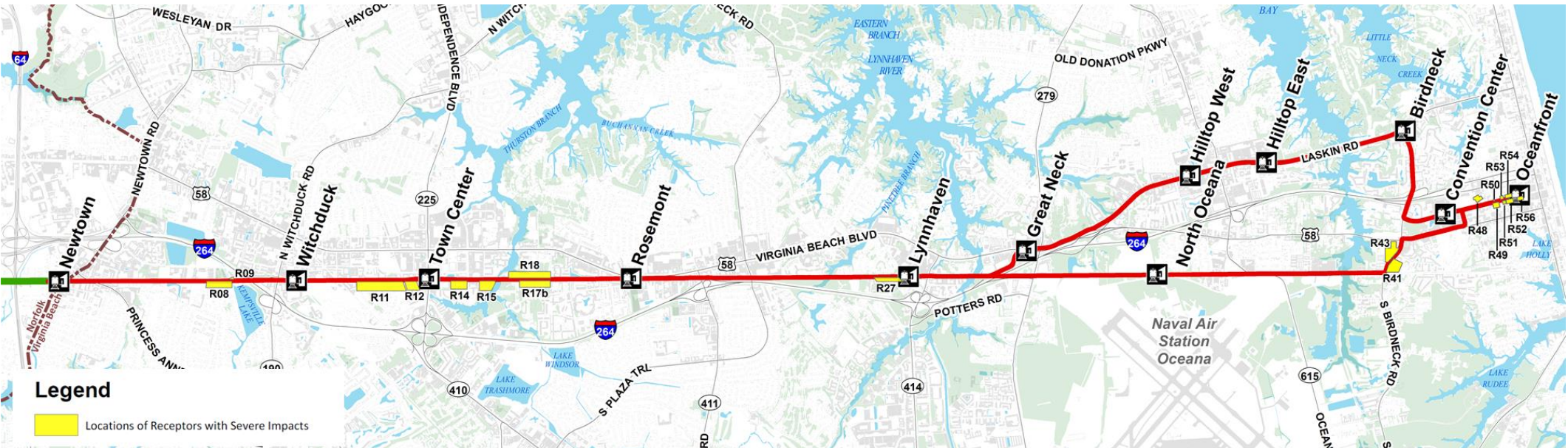


Table 5.8-9 | FTA Non-Standard General Construction Noise Criteria

Land Use	One-hour $L_{eq}$ , dBA	
	Daytime	Nighttime
Residential	90	80
Commercial	100	100
Industrial	100	100

Source: FTA Transit Noise and Vibration Impact Assessment report, 2006

Feeder Buses

Noise

The new feeder bus routes proposed as part of the LRT and BRT build alternatives were analyzed using the FTA methodology to determine their effects from noise. It was found that no impacts are projected to occur as a result of the introduction of additional feeder bus routes.

Table 5.8-10 | Construction Damage Vibration Criteria

Building Category	PPV,	$L_v$ , VdB
Reinforced concrete, steel or timber	0.5	102
Engineering concrete and masonry	0.3	98
Non-engineered timber and masonry	0.2	94
Buildings extremely susceptible to vibration damage	0.12	90

Source: FTA Transit Noise and Vibration Impact Assessment report, 2006

Vibration

The new feeder bus routes proposed as part of the LRT and BRT alternatives were analyzed using the FTA methodology. It was found that there were no impacts due to the additional buses.

5.8.5 Construction Impacts

Noise

Construction-related activities produce short-term noise and vibration. For general assessment purposes, the FTA offers non-standardized noise criteria for evaluating the combined noise levels of the two loudest pieces of construction equipment. Table 5.8-9 summarizes the noise criteria.

Vibration

As construction is a relatively short-term event, damage caused by construction vibration is a greater concern than annoyance caused by construction vibration. Table 5.8-10 provides the vibration damage criteria as stated in the FTA manual. The peak particle velocity (PPV) is the maximum of the vibration signal.

Construction activities near residential areas should be limited to daytime hours to minimize potential sleep disturbance. All equipment used during the construction process should be properly maintained, with mufflers that perform as well or better than the original mufflers provided by the manufacturer.

A thorough construction noise and vibration analysis would be prepared for the locally preferred alternative during final design. Construction-related noise and vibration mitigation measures would be evaluated at that time.

5.8.6 Indirect Effects

Indirect effects of the alternatives would be the result of changes in traffic patterns and urban development related to improvements in transit service. Localized areas near Park & Ride lots could see increased roadway traffic, which would increase noise and vibration levels in those areas. The new public transportation system could draw new residential and commercial developments that could attract additional traffic and therefore result in an increased level of noise and vibrations.

5.8.7 Avoidance, Minimization, and Mitigation

LRT Build Alternatives

Noise

In order to determine strategies for mitigation of noise caused by the LRT build alternatives, the sources of noise would need to be identified at each receptor where there would be impacts. The primary sources of noise from the light rail build alternatives are:

- ~ **Light rail vehicles** – the light rail vehicles would have steel wheels and run on steel tracks;
- ~ **Transit warning devices** – horns and bells on the light rail vehicle would sound as the vehicle approaches a grade crossing;
- ~ **Crossing signals** – bells at the gated crossings would warn vehicles of a train crossing;
- ~ **Crossovers** – segments of track where light rail vehicles can move from one track to another; and
- ~ **Vehicle storage and maintenance facility** – the buildings and surrounding yard where the light rail vehicles would be stored and maintained. For Alternatives 2 and 3, the light rail VSMF would be on a parcel owned by the City of Virginia Beach off of Potters Road.

- ~ **Feeder buses idling** – diesel buses waiting at a bus stop for a timed transfer or scheduled wait point
- ~ **Passing feeder buses** – noise from new bus routes where HRT does not currently operate

Detailed information showing how each of these noise sources contributes to project noise at each receptor can be found in **Appendix Q**. The individual source sound levels indicate the transit warning device (train horn) yields the highest levels and is a contributing factor to every potential severe impact. Receivers R6, R21, and R22 experience noise from the transit vehicle alone; the use of wheel skirts (panels that cover the vehicle wheels) may offer potential noise reduction. Receivers R8 and R17b are most influenced by the transit warning device; however, noise from the transit vehicle or crossing signal would cause moderate impacts even without the transit warning device. Receivers R9, R11, R12, R18, and R35a have transit vehicle or crossing signal levels within 3 dBA of the moderate impact threshold. Even if the transit warning device levels were reduced, the combination of the noise contributions would likely yield impacts.

To reduce noise produced by the crossing signals, consideration could be given to “chirp” audible warnings instead of the transit warning device and wayside bell system. These “chirp” signals are generally considered less intrusive on the ambient noise environment. If necessary, barriers could be considered during final design at some locations after additional study.

#### Vibration

The primary sources of vibration from the light rail transit build alternatives are:

- ~ Wayside vibration from the light rail vehicles traveling on the tracks; and
- ~ Vibration from the light rail vehicles passing over special trackwork (e.g. crossovers).

The analysis showed that a majority of the vibration impacts from the LRT build alternatives occur at crossovers. The effects of special trackwork vibration could be mitigated by

relocating the crossovers away from vibration-sensitive receivers. When relocation would not be possible, other methods of mitigation could include using high-resilience fasteners, ballast mats, floating slab trackbeds, and resiliently supported ties.

#### BRT Build Alternatives

##### Noise

The primary sources of noise from the bus rapid transit build alternatives are:

- ~ **Passing vehicles** – bus rapid transit vehicles with rubber tires traveling on an asphalt surface busway;
- ~ **BRT Idling** – idling Bus Rapid Transit vehicles at stations;
- ~ **Vehicle storage and maintenance facility** – the buildings and surrounding yard where the BRT vehicles would be stored and maintained. The BRT VSMF would be on a parcel owned by the City of Virginia Beach off of Potters Road;
- ~ **Feeder buses idling** – diesel buses waiting at a station for timed transfer or scheduled wait point; and
- ~ **Passing feeder buses** – noise from new bus routes where HRT does not currently operate.

The details explaining how each of these noise sources contributes to project noise at each receptor can be found in **Appendix Q**. The two moderate noise impacts are due to the BRT vehicle itself at receptor R6 (for Alternatives 1A, 1B, 2, and 3), and BRT vehicles idling at the Oceanfront Station at receptor R56 (for Alternatives 2 and 3). Mitigation measures are limited to using quieter vehicles (specific vehicles have not been chosen for the BRT alternatives or using barriers to block the transmission of sound between buses and the nearby receivers.

##### Vibration

No vibration impacts were found for the BRT build alternatives or the feeder bus routes, so mitigation measures are not needed.

## 5.9 Hazardous Regulated Materials

The VBTES Corridor is located within an urban area that has been largely developed for many years, with an array of industrial, commercial, and residential uses. A review of documented hazardous materials releases and potential hazardous materials sites was conducted within the VBTES Corridor, and a summary of existing conditions and potential impacts is presented in this section.

### 5.9.1 Legal and Regulatory Context

The U.S. Environmental Protection Agency (EPA) and Virginia Department of Environmental Quality (VADEQ) regulate the handling, storage, generation, and use of oil and hazardous materials (OHMs). Laws and regulations relevant to soil and water contamination and hazardous materials include:

- ~ **Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (42 USC 9601 et seq.)**: CERCLA was enacted by Congress on December 11, 1980, establishing a tax on the chemical and petroleum industries and providing broad federal authority to respond directly to releases or threatened releases of hazardous substances that could endanger public health or the environment. CERCLA establishes prohibitions and requirements concerning closed and abandoned hazardous waste sites; provides for liability of persons responsible for releases of hazardous waste at these sites; and establishes a trust fund to provide for cleanup when no responsible party could be identified. CERCLA further requires that the EPA be notified any time there is a release of a reportable quantity of OHMs. In October 1986, CERCLA was amended by the Superfund Amendments and Reauthorization Act (SARA). SARA made several important additions to the program, including increasing the size of the trust fund, providing new enforcement authorities, and increasing state involvement in the program.
- ~ **Resource Conservation and Recovery Act (RCRA) (42 USC 6901 et seq.)**: RCRA was passed on October 21, 1976 to address the growing volume of municipal and

industrial waste. The act sets national goals for: protecting human health and the environment from the potential hazards of waste disposal; conserving energy and natural resources; reducing the amount of waste generated; and ensuring that wastes are managed in an environmentally-sound manner. RCRA establishes the foundation for the issuance of federal permits and state permitting programs for varied activities related to hazardous materials including storage, transport, treatment, and disposal. RCRA also requires those responsible for releasing hazardous pollutants into the soil, water, or air to clean up those releases.

- ~ **Virginia Hazardous Waste Management Regulations (9 VAC 20-60)**: The Virginia DEQ regulates the use, storage, and generation of OHMs through the Virginia Hazardous Waste Management Regulations, which are closely based on federal standards established under RCRA. State permits are required for storage, treatment, and disposal of hazardous wastes.

### 5.9.2 Methodology

EPA and VADEQ maintain records of known hazardous materials sites and enforce specific guidelines for the treatment and removal of OHMs at these sites. Information on the presence of hazardous materials or wastes within the VBTES Corridor was obtained through a hazardous sites database review. The review report and map was completed by Environmental Data Resources, Inc. (EDR) in April 2013. The data sources investigated by EDR were those outlined by the American Society for Testing and Materials (ASTM) standards. The full list of data sources and table of findings are provided in **Appendix R**.

For the purposes of this DEIS, the potential for an impact was considered to occur where a parcel with a known hazardous material concern would be disturbed by project construction. Specific details of contaminated materials (type, quantity, extent, etc.) were not determined for this DEIS. Such information can only be accurately obtained during detailed project design, when soil and groundwater sampling and analysis are completed to characterize soil and groundwater conditions.

To find the areas of the VBTES Corridor that would have the highest likelihood of encountering hazardous materials

contamination, each site or property affected by the project (within or immediately adjacent to the project’s defined limit of disturbance, or LOD) with a database listing was assigned a Low-Medium-High risk ranking relative to the possibility of encountering OHMs. For purposes of this assessment, properties that are adjacent to the LOD have a property boundary that touches the LOD limit. A High risk ranking was assigned to those properties with a database listing that indicates a documented release of OHMs, or past site use known to have a higher likelihood of a release. A Medium risk ranking was assigned to properties with a database listing that does not have a documented release of OHMs, but stores, generates, or transports OHMs. A Low risk ranking was assigned to properties that have a database listing included in the EDR report, but do not have a documented release of OHMs; do not have a past site use known to have a higher likelihood of a release; or do not store, generate, or transport OHMs. Where properties have more than one database listing, they were assigned the highest risk rating.

5.9.3 Existing Conditions

A review of previous documentation pertaining to hazardous materials in the VBTES Corridor revealed that a Phase I Environmental Site Assessment (ESA) report was completed on August 19, 2009 by GeoEnvironmental Resources, Inc. (GER) as part of the City of Virginia Beach’s purchase of the former NSRR ROW. The study area for the GER assessment was smaller than the one investigated for the current VBTES project. The GER report was performed in accordance with the ASTM-05, Standard Practice for Environmental Site Assessments, and 40 CFR Part 312. The 2009 Phase I GER report identified properties with recognized environmental conditions (RECs) that were adjacent to the former NSRR ROW from Newtown Road to Birdneck Road. Among the properties noted in the report were current or former gasoline stations, bulk fuel storage facilities, heating oil tanks, and maintenance facilities. The report also noted that soil and/or groundwater sampling would be required to determine if these sites would impact the proposed construction of the build alternatives.

A Phase II Soil & Groundwater Sampling report was completed by GER on December 21, 2009. This 2009 Phase

II GER report detailed limited soil and groundwater sampling/analysis and assessment of the former NSRR ROW from a point west of Newtown Road (in the west) to Birdneck Road (in the east). The soil and groundwater sampling and analysis activities were meant to determine if petroleum, metal, solvent and/or pesticide contamination was present in the NSRR ROW. The procedures for this investigation were performed in accordance with ASTM Standard E1903 and FTA guidelines. The 2009 Phase I and Phase II GER reports are included in **Appendix R**.

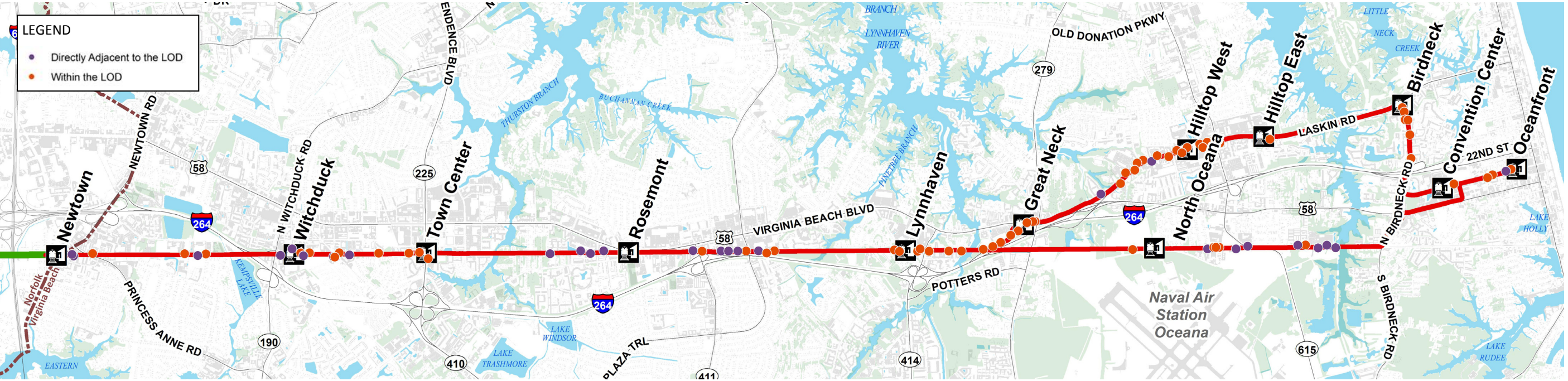
Of the 33 soil samples analyzed, four samples were above their respective detection limits: two samples adjacent to 100 Sykes Avenue, one sample adjacent to 2403 Virginia Beach Boulevard, and one sample adjacent to 4831 Columbus Street. If soil is excavated and transported from these locations, special handling would be required. Analysis of groundwater samples revealed that all were below their applicable method detection limits. GER recommended that the report be sent to VADEQ with a request for a “No Further Action” (NFA) letter.

A more recent EDR database review (2013 EDR Report) indicated sites on or adjacent to the former NSRR ROW that

related to a range of uses including dry cleaners, gasoline stations, convenience stores, residences, manufacturing companies, and schools. These sites, including their database listing (CERCLA, RCRA, etc.) are described in **Appendix R**.

The 2013 EDR report included 93 properties mapped as hazardous materials sites within the VBTES Corridor— 67 within the LOD and 26 adjacent to the LOD. See **Figure 5.9-1** for details. Most of the potential hazardous materials sites identified in the VBTES Corridor are from petroleum and auto-related contamination. There were no properties identified as CERCLA sites, and 33 properties were identified as RCRA sites. According to the 2013 EDR report, nine of the 96 potential hazardous materials sites identified within the VBTES Corridor have a status of “closed” from the applicable regulatory agency. The “closed” designation indicates that cleanup and/or enforcement actions have been completed for the hazardous materials release cases at that property. According to the 2013 EDR report, the remaining 84 hazardous materials sites have not completed cleanup and/or enforcement actions for their hazardous materials release cases. As part of the 2009 Phase II GER assessment, soil and groundwater testing and analysis were

Figure 5.9-1 | Hazardous Materials Sites within the VBTES Corridor



Source: Fitzgerald & Halliday, 2014

not conducted at any of the 93 hazardous materials properties within the VBTES Corridor.

5.9.4 Environmental Impacts

No Build Alternative

Under the No Build alternative, the VBTES project would not be undertaken. However, substantial soil disturbance would occur within the planned right of way of Laskin Road due to the demolition and grading required for roadway widening by others. This widening is a planned and funded project by VDOT and would occur regardless of the VBTES project. VDOT has procedures in place to address potentially contaminated properties, including measures to avoid or minimize effects from hazardous materials during construction in accordance with applicable rules and regulations.

Build Alternatives

It is not anticipated that normal day-to-day operation of either the LRT or BRT under any of the proposed build alternatives would release new hazardous materials to the

environment. However, in the event of an accident, there could potentially be a release of new hazardous materials. For the BRT alternatives, if a motor vehicle accident occurred, there could be a release of diesel fuel and/or OHMs. For the LRT alternatives, an accident could result in the release of OHMs. OHMs would likely be used, stored, and generated at the VSMF and could be released in the event of an accident.

HRT incorporates hazardous materials safety practices and protocols to prevent such releases at their facilities. HRT also follows all applicable local, state, and federal regulations related to the use, storage, generation, and transportation of hazardous materials. Therefore, impacts resulting from the operation of the LRT or BRT are unlikely.

5.9.5 Construction Impacts

Based on the EDR database review, there is the potential to encounter OHMs during construction activities for all of the build alternatives. Construction activities that may disturb contaminated materials within the LOD include excavation, site dewatering, and the demolition of buildings. Dewatering activities could also affect contamination

Table 5.9-1 | Number of Hazardous Material Sites by Alternative

Potential Contamination Risk*	ALTERNATIVE				Vehicle Storage and Maintenance Facility
	1A	1B	2	3	
	Town Center Alternative	Rosemont Alternative	NSRR Alternative	Hilltop Alternative	
WITHIN THE LOD					
High	7	7	30	47	0
Medium	4	4	5	5	0
Low	0	0	2	5	0
Total	11	11	37	57	0
ADJACENT TO THE LOD					
High	5	8	21	16	0
Medium	2	3	3	3	0
Low	0	0	0	0	0
Total	7	11	24	19	0

Source: Fitzgerald & Halliday, 2014

\* **High** = Property with a documented release of OHMs, or past site use known to have a higher likelihood of a release.  
**Medium** = Property with no documented release of OHMs, but stores, generates, or transports OHMs.  
**Low** = Property listed in a regulatory agency database but with no documented release of OHMs; no past site use known to have a higher likelihood of a release; and does not store, generate or transport OHMs.

Table 5.9-2 | Number of High Risk Hazardous Material Sites by Alternative

Potential Contamination Risk*	ALTERNATIVE				Vehicle Storage and Maintenance Facility
	1A	1B	2	3	
	Town Center Alternative	Rosemont Alternative	NSRR Alternative	Hilltop Alternative	
WITHIN THE LOD					
Confirmed petroleum contamination (Auto)	0	0	1	5	0
Possible petroleum contamination (Auto)	0	0	8	7	0
Confirmed petroleum contamination (UST)	5	5	11	18	0
Confirmed petroleum contamination (AST)	0	0	0	2	0
Confirmed petroleum contamination (Gas station)	0	0	0	1	0
Possible petroleum contamination (Gas station)	0	0	1	1	0
Possible petroleum contamination (UST)	1	1	5	5	0
Possible solvent contamination (Dry cleaner)	0	0	2	4	0
Confirmed solvent contamination (Dry cleaner)	0	0	0	1	0
Possible petroleum and solvent contamination (Newspaper)	1	1	1	1	0
No information available	0	0	1	2	0
Total	7	7	30	47	0
ADJACENT TO THE LOD					
Confirmed petroleum contamination (Auto)	0	1	3	4	0
Possible petroleum contamination (Auto)	1	1	4	1	0
Confirmed petroleum contamination (UST)	3	5	9	6	0
Possible petroleum contamination (UST)	1	1	5	5	0
Total	5	8	21	16	0

Source: Fitzgerald & Halliday, 2014

outside the LOD if the dewatering changes the groundwater gradient causing contaminants to migrate to other surface or groundwater resources.

To compare the relative risks of encountering hazardous materials during construction, an inventory of the known or potential hazardous materials sites within or immediately adjacent to the LOD was conducted (**Table 5.9-1** and **Figure 5.9-1**). The project could also encounter unknown hazardous materials during construction beyond the documented hazardous materials sites identified in the EDR database search.

Based upon the results of the 2009 Phase II GER assessment, groundwater impacts are not anticipated within the NSRR ROW. If soils within the former NSRR ROW are disturbed, special hazardous materials handling and transport practices would be required at select locations as explained above and in the 2009 Phase II GER report.

**Table 5.9-2** summarizes the high risk properties identified for each alternative, including the type of hazardous material reported and the site use.

Under Alternative 1A, 18 mapped hazardous materials sites were identified. Eleven hazardous materials sites were located within the LOD, and seven were located adjacent to the LOD. The seven properties with a high risk of having contamination identified within the LOD include five confirmed petroleum contamination (UST), one possible petroleum contamination (UST), and one possible petroleum and solvent contamination (newspaper). The five properties with high risk of having contamination identified adjacent to the LOD include one possible petroleum contamination (auto), three confirmed petroleum contamination (UST), and one possible petroleum contamination (UST). The greatest number of potential hazardous materials sites occurs in the vicinity of the planned Witchduck Station.

Under Alternative 1B, 22 mapped hazardous materials sites were identified. Eleven hazardous materials sites were located within the LOD, and 11 were located adjacent to the LOD. The seven properties with a high risk of having contamination identified within the LOD include five

confirmed petroleum contamination (UST), one possible petroleum contamination (UST), and one possible petroleum and solvent contamination (newspaper). The eight properties with high risk of having contamination identified adjacent to the LOD include one confirmed petroleum contamination (auto), one possible petroleum contamination (auto), five confirmed petroleum contamination (UST), and one possible petroleum contamination (UST). The greatest number of potential hazardous materials sites for Alternative 1B are located near the proposed Witchduck Station, as is the case with Alternative 1A.

Under Alternative 2, 61 potential hazardous materials sites were identified. Thirty-seven potential hazardous materials sites were located within the LOD, and 24 were located adjacent to the LOD for this alternative. The 30 properties with high risk of having contamination identified within the LOD include one confirmed petroleum contamination (auto), eight possible petroleum contamination (auto), 11 confirmed petroleum contamination (UST), five possible petroleum contamination (UST), two possible solvent contamination (dry cleaner), one possible petroleum contamination (gas station), one possible petroleum and solvent contamination (newspaper), and one with no information available. The 21 properties with high risk of having contamination identified adjacent to the LOD include three confirmed petroleum contamination (auto), four possible petroleum contamination (auto), nine confirmed petroleum contamination (UST), and five possible petroleum contamination (UST). Although the EDR data indicates that listed sites are located throughout the VBTES Corridor, there are concentrations of sites in the vicinity of the planned Witchduck Station, in the vicinity of Rosemont Road and South Plaza Trail, and between the planned Lynnhaven and Great Neck Stations.

Under Alternative 3, 76 potential hazardous materials sites were identified. Fifty-seven potential hazardous materials sites were located within the LOD, and 19 were located adjacent to the LOD for this alternative. Forty-seven properties with high risk of having contamination were

identified within the LOD, including five confirmed petroleum contamination (auto), seven possible petroleum contamination (UST), two confirmed petroleum contamination (AST), one confirmed petroleum contamination (gas station), one possible petroleum contamination (gas station), five possible petroleum contamination (UST), four possible solvent contamination (dry cleaner), one confirmed solvent contamination (dry cleaner), one possible petroleum and solvent contamination (newspaper), and two with no information available. The 16 properties with high risk of having contamination adjacent to the LOD include four confirmed petroleum contamination (auto), one possible petroleum contamination (auto), six confirmed petroleum contamination (UST) and five possible petroleum contamination (UST). Although the EDR data indicates that listed sites are located throughout the VBTES Corridor, there are concentrations of sites in the vicinity of the planned Witchduck Station, in the vicinity of Rosemont Road and South Plaza Trail, between the planned Lynnhaven and Great Neck Stations, and in the vicinity of the Hilltop West Station.

#### LRT VSMF

The LRT VSMF would be located just north of the former NSRR ROW on the Potters Road site owned by the City of Virginia Beach. There are no listed sites mapped at the planned LRT VSMF.

#### BRT Build Alternatives

All of the BRT alternatives would be located along the previously described LRT alternatives' alignments. As such, the impacts would be the same for each BRT build alternative as those described above for the similar LRT alternative.

### 5.9.6 Indirect Effects

Other than the construction period impacts noted above, impacts to hazardous materials sites of concern only occur when there is a direct interface between an existing hazardous materials site and an element of or activity related to the proposed project. Consequently, impacts

from hazardous waste or materials are evaluated based on the proximity of the hazardous materials site to the proposed alternatives and its potential to be directly disturbed. No indirect impacts from hazardous materials would occur under the No Build or any of the build alternatives.

### 5.9.7 Avoidance, Minimization, and Mitigation

During construction, the contractor would comply with all applicable environmental rules and regulations. Despite measures to manage risks associated with hazardous materials, spills can occur or unknown contaminants can be encountered. These materials can result in short-term contamination to the environment before avoidance actions can be taken.

Sites with a high potential of having contamination have been identified within the project LOD for each of the build alternatives. The following measures are proposed to avoid or minimize effects from hazardous materials during construction where there is known or suspected contamination within the LOD:

- ~ The contractor would prepare a spill prevention control and countermeasure (SPCC) plan that provides specific guidance for managing contaminated media that may be encountered.
- ~ The City of Virginia Beach (or HRT acting as the project operator) may be responsible for the remediation and monitoring of contaminated properties that would be acquired for this project. In such cases, the City or HRT would further evaluate the identified properties to assess their condition prior to acquisition or construction.
- ~ If the City acquires a portion or all of a property (building, structure) suspected of including Asbestos Containing Materials (ACM) or Lead Based Paint (LBP), the contractor would properly abate and dispose of identified ACM and LBP contamination prior to construction activities. All ACM and LBP abatement activities would be conducted in compliance with appropriate regulations.



- ~ Construction waste material and/or other harmful materials disposal would take place at approved sites.
- ~ If an old, abandoned, or failing UST is located on a property within the LOD that has been acquired by the City, the City and/or HRT would assume cleanup liability for the appropriate decommissioning and removal of the UST. If soil or groundwater contamination associated with the UST is discovered, the soil or groundwater cleanup activities would be performed by the City and/or HRT in accordance with all applicable rules and regulations associated with UST removal activities.
- ~ The construction contractor would be required to meet all regulatory conditions imposed at contaminated properties (e.g. Consent Decree) associated with construction. These conditions could include ensuring that the surrounding properties and population are not exposed to contaminants on the site; i.e., the contractor would ensure that the site is properly contained after construction is completed so that contaminants do not migrate offsite and so that the health and safety of all onsite personnel are protected during work at the site.

The following measures are proposed to avoid or minimize effects from hazardous materials during construction where there is known or suspected contamination outside the LOD or project right-of-way:

- ~ Contaminated groundwater originating from properties up-gradient of the LOD could migrate to the project area. HRT would not incur liability for groundwater contamination that has migrated into the project footprint as long as the agency does not acquire the source of the contamination. However, HRT would manage the contamination in accordance with all applicable rules and regulations.

The following measures are proposed to avoid or minimize effects from hazardous materials during construction where the contamination did not previously exist or was unknown:

- ~ During construction, industry-standard accident and

- hazardous materials recovery training and procedures, including those outlined by the Occupational Safety and Health Administration (OSHA), would be enforced by the state and followed by the transportation companies and contractors.
- ~ A SPCC plan would be established for the project. While the SPCC plan would address prevention measures, a contingency plan would also be developed to address spill containment and cleanup and management of contaminated soil and groundwater in the event of an accidental spill.
  - ~ As required under state and federal law, plans for notification and evacuation of site workers and local residents in the event of a hazardous materials release would be in place throughout construction.
  - ~ If unknown contamination is found during construction, the construction contractor would follow the SPCC plan as well as all appropriate regulations.

Additional investigations for the presence of OHMs would be required to determine if mitigation would be necessary under each of the proposed build alternatives. Further investigation, including site-specific, ASTM-compliant Phase I ESAs may be required. If recognized environmental conditions are confirmed at these properties and a Phase II ESA is recommended, further investigation in the form of subsurface soil and groundwater investigations and laboratory testing would be conducted. The mitigation requirements would depend upon the extent and nature of the hazardous waste or materials found, the construction activity proposed, and the intended uses of the site.

5.10 Energy

This section details the potential impacts of the VBTES project alternatives on energy consumption.

5.10.1 Legal and Regulatory Context

Although not a federal, state or local regulation, HRT implemented an agency-wide Environmental Management System (EMS) in 2009. The EMS is a systematic approach to

reduce or eliminate adverse environmental impacts resulting from HRT operations. One of the primary objectives of the EMS is reducing overall energy consumption. Operational controls in the EMS aimed at reducing energy include:

- ~ Reduced bus idling
- ~ Preventative bus maintenance
- ~ Energy-saving management
- ~ Facility lighting replacement
- ~ HVAC settings and control

HRT has also voluntarily signed the American Public Transit Association (APTA) Sustainability Commitment and the International Association of Public Transport (UITP) Charter on Sustainable Development. In 2006, HRT began switching diesel vehicles in the bus fleet to ultra-low sulfur diesel fuel to reduce emissions. Additionally, HRT has integrated hybrid -electric (hybrid) buses into the fleet. The hybrid buses are up to 30% more fuel efficient than diesel buses.

5.10.2 Methodology

Energy use was calculated for each of the alternatives in terms of Vehicle Miles Traveled (VMT) and British Thermal Units (BTUs). VMT is the total number of miles traveled by a vehicle in a certain study area and within a certain period of time. VMT directly affects fuel use, air emissions and traffic levels. BTUs are a standardized unit of energy consumption, defined as the amount of heat required to raise the temperature of one pound of water at maximum density through one degree Fahrenheit. For transportation projects, including the VBTES project, energy use is predominately influenced by the amount and type of fuel expended on transportation.

A quantitative assessment of each alternative’s transportation-related energy use (in BTUs) in the VBTES Corridor was calculated by multiplying the average annual VMT by the fuel consumption rate for each mode. Energy impacts from the project were derived from these

<sup>1</sup>Transportation Energy Data Book, Edition 32, Oak Ridge National Laboratory, U.S. Department of Energy, July 2013.

calculations and are reported in the impacts section below.

Several assumptions were made in the analysis, including:

- ~ The average energy intensities for automobiles (gasoline), transit buses (diesel) and transit rail (electricity) modes were utilized for this assessment<sup>1</sup>. Due to differences in routes, services, ridership and many other factors, it is difficult to obtain truly comparable energy intensities among modes. There may be significant variability within a mode and within mode comparisons. The following energy intensities are averages used for comparison purposes, and are not exact values.
  - Automobiles = 5,214 BTU per vehicle mile
  - Transit Buses = 37,718 BTU per vehicle mile
  - Transit Rail = 64,585 BTU per vehicle mile
- ~ The typical BRT vehicle type used for calculations was the 60 Foot Stylized Articulated New Flyer DE60LF-BRT, since the make and model of BRT vehicles have not been determined. The diesel fuel consumption rate is 5.1 miles per gallon (mpg), with a diesel hybrid-electric propulsion system<sup>2</sup>.
- ~ To be conservative, for purposes of this assessment, hybrid bus fuel consumption rates were calculated to have a 30% increase in fuel economy compared with the diesel bus rate<sup>3</sup>. Road test results of hybrid-electric transit buses have resulted in between 25% to 50% improvement in fuel economy over diesel buses.
- ~ Total VMT was calculated by adding the peak and off-peak VMT data.

<sup>2</sup>Vehicle Catalog A Compendium of Vehicles and Powertrain Systems for Bus Rapid Transit Service, Westart-CALSTART, sponsored by the Federal Transit Administration (FTA), 2006 Update.

<sup>3</sup>Hybrid-diesel vs. CNG (an updated comparison of transit fleet alternatives), Steve Richardson, Public Solutions Group, Ltd., January 2013.

<sup>4</sup>Alternative Fuels Data Center – Fuel Properties Comparison, U.S. Department of Energy, [http://www.afdc.energy.gov/fuels/fuel\\_comparison\\_chart.pdf](http://www.afdc.energy.gov/fuels/fuel_comparison_chart.pdf)



- ~ A conversion factor of 137,380 BTUs per gallon of diesel fuel was used for hybrid bus calculations<sup>4</sup>.
- ~ The HRT fleet of buses includes approximately 9% hybrid buses, which use both diesel and electricity as fuel sources. The remaining buses in the fleet use diesel as their fuel source. The annual VMT for hybrid buses is 9% of the annual VMT for the HRT bus fleet.

A qualitative assessment of the construction energy expenditures for the project alternatives is also included in the impacts section below.

5.10.3 Existing Conditions

Transportation energy consumed in the VBTES Corridor currently consists of gasoline (by automobiles), diesel fuel (by trucks and buses) and electricity (by LRT vehicles). The regional energy data provided by HRT and the engineering team was used to quantify the existing energy expenditures in the VBTES Corridor as shown in **Table 5.10-1**. Data provided was for the most recent year available, 2011. Automobiles consumed 63,400 billion BTUs (bBTUs), compared to 25 bBTUs for hybrid buses, 363 bBTUs for diesel buses and 23 bBTUs for LRT. The BRT does not currently operate, so existing conditions energy calculations were not conducted for this mode.

5.10.4 Environmental Impacts

The proposed project’s impacts involve changes in energy consumption for transportation modes along area roadways, and changes in energy use by the public transit system. **Table 5.10-1** shows the existing and forecasted energy expenditures for all project alternatives. **Table 5.10-2** shows the difference in energy consumption for each build alternative compared with the No Build alternative.

Implementing the VBTES LRT or BRT build alternatives would decrease greenhouse gas (GHG) emissions:

- ~ LRT and BRT use reduces travel by private vehicles, which reduces the amount of greenhouse gases produced in the area.

Table 5.10-1 | Existing (2011) and 2034 Energy Consumption by Travel Mode (bBTU)

Travel Mode	2011	2034								
		LIGHT RAIL ALTERNATIVES				BUS RAPID TRANSIT ALTERNATIVES				No Build
	Existing	1A	1B	2	3	1A	1B	2	3	
Auto	63,400	82,000	81,900	81,700	81,700	82,000	82,000	81,800	81,800	82,000
Bus (Diesel)	363	386	386	386	384	386	386	386	384	363
Bus (Hybrid)	25	27	27	27	27	27	27	27	27	25
LRT	23	32	37	60	62	23	23	23	23	23
BRT	--	--	--	--	--	103	152	405	427	0
Total	63,811	82,445	82,350	82,173	82,173	82,539	82,588	82,641	82,661	82,411

Source: Fitzgerald & Halliday, 2014

Table 5.10-2 | Difference in Energy Consumption from No Build by Travel Mode (bBTU)

Travel Mode	Change from No Build							
	LIGHT RAIL ALTERNATIVES				BUS RAPID TRANSIT ALTERNATIVES			
	1A	1B	2	3	1A	1B	2	3
Auto	0	-100	-300	-300	0	0	-200	-200
Bus (Diesel)	23	23	23	21	23	23	23	21
Bus (Hybrid)	2	2	2	2	2	2	2	2
LRT	9	14	37	39	0	0	0	0
BRT	--	--	--	--	103	152	405	427
Total	34	-61	-238	-238	128	177	230	250

Source: Fitzgerald & Halliday, 2014

- ~ A mode shift to LRT and/or BRT from personal vehicles would reduce congestion and traffic. The less time vehicles spend on the road, especially idling, the less greenhouse gases they emit.
- ~ The LRT alternatives would be powered by electricity, which would emit less greenhouse gases in the VBTES Corridor than gasoline used by private vehicles.
- ~ In December 2008, the Virginia Governor’s Commission on Climate Change released its *Final Report: A Climate Change Action Plan*. The VBTES project supports one of the nine goals outlined in the plan: “Virginia will reduce GHG emissions related to vehicle miles traveled through expanded commuter choice, improved transportation system efficiency, and improved community designs.” The LRT and BRT alternatives would provide more choices for commuters and improve the efficiency of the transportation system in the VBTES Corridor. The reduction of greenhouse gases from these alternatives would also help to curb the negative impacts from climate change.

The VBTES build alternatives also have the potential to conserve energy, including:

- ~ Reducing the use of personal vehicles in the project area and saving energy by sharing trips;
- ~ Moving away from fossil fuel usage in vehicles by utilizing the more efficient electrically-powered LRT vehicles;
- ~ Allowing for the movement of more people per trip as both LRT and BRT vehicles have a larger passenger capacity than existing transit buses and personal vehicles;
- ~ A reduction in congestion leads to less fuel utilized by private vehicles; and
- ~ Improving the transit service by consolidating bus trips under the BRT alternative.

The specific impacts of each of the alternatives are discussed on the next page.



### No Build Alternative

Under the No Build alternative, the VBTES project would not be undertaken. However, the No Build alternative considers planned transportation improvements that would be implemented by the year 2034.

### LRT Build Alternatives

The LRT alternatives have the potential to shift a small percentage of auto-related trips to light rail. Energy consumption compared with the No Build alternative would be less for all but one of the LRT alternatives as a result of this mode shift, as described below.

#### ALTERNATIVE 1A: Town Center Alternative

Under this alternative, long-term automobile energy consumption would be expected to be the same as the No Build. Diesel bus energy consumption would be expected to be 23 bBTU more than the No Build. Hybrid bus energy consumption would be expected to be 2 bBTU more than the No Build. LRT energy expenditures are forecasted to be 9 bBTU more than the No Build. Overall, energy consumption would be expected to be approximately 34 bBTU more than the No Build alternative. This net increase is because there is no reduction in automobile energy consumption to offset the increases of other modes.

#### ALTERNATIVE 1B: Rosemont Alternative

Under this alternative, long-term automobile energy consumption would be expected to be 100 bBTU less than the No Build. Diesel bus energy consumption would be expected to be 23 bBTU more than the No Build. Hybrid bus energy consumption would be expected to be 2 bBTU more than the No Build. LRT energy expenditures are forecasted to be 14 bBTU more than the No Build. Overall, energy consumption would be expected to be approximately 61 bBTU less than the No Build alternative.

#### ALTERNATIVE 2: NSRR Alternative

Under this alternative, long-term automobile energy consumption would be expected to be 300 bBTU less than the No Build. Diesel bus energy consumption would be expected to be 23 bBTU more than the No Build. Hybrid bus

energy consumption would be expected to be 2 bBTU more than the No Build. LRT energy expenditures are forecasted to be 37 bBTU more than the No Build. Overall, energy consumption would be expected to be approximately 238 bBTU less than the No Build alternative.

#### ALTERNATIVE 3: Hilltop Alternative

Under this alternative, long-term automobile energy consumption would be expected to be 300 bBTU less than the No Build. Diesel bus energy consumption would be expected to be 21 bBTU more than the No Build. Hybrid bus energy consumption would be expected to be 2 bBTU more than the No Build. LRT energy expenditures are forecasted to be 39 bBTU more than the No Build. Overall, energy consumption would be expected to be approximately 238 bBTU less than the No Build alternative.

#### LRT VSMF

The LRT or BRT VSMF would be located just north of the former NSRR ROW at Potters Road. HRT promotes and implements environmentally sustainable practices at its facilities and would incorporate such elements at the VSMF proposed under this project. Energy efficient operating practices are a part of current HRT procedures and are expected to continue in the future.

### BRT Build Alternatives

All of the BRT alternatives would be located along the previously described LRT alternatives' routes. The BRT alternatives have the potential to shift ridership from personal automobiles to BRT. Despite this mode shift, energy consumption compared with the No Build would increase as described below. The BRT VSMF would implement the same environmentally sustainable practices as the LRT VSMF.

#### ALTERNATIVE 1A: Town Center Alternative

Under this alternative, long-term automobile energy consumption would be expected to be approximately the same as the No Build. Diesel bus energy consumption would be expected to be 23 bBTU more than the No Build. Hybrid bus energy consumption would be expected to be 2 bBTU more than the No Build. LRT energy expenditures are forecasted to be approximately the same as the No Build.

BRT energy consumption would be expected to be 103 bBTU more than the No Build. Overall, energy consumption would be expected to be approximately 128 bBTU more than the No Build alternative.

#### ALTERNATIVE 1B: Rosemont Alternative

Under this alternative, long-term automobile energy consumption would be expected to be approximately the same as the No Build. Diesel bus energy consumption would be expected to be 23 bBTU more than the No Build. Hybrid bus energy consumption would be expected to be 2 bBTU more than the No Build. LRT energy expenditures are forecasted to be approximately the same as the No Build. BRT energy consumption would be expected to be 152 bBTU more than the No Build. Overall, energy consumption would be expected to be approximately 177 bBTU more than the No Build alternative.

#### ALTERNATIVE 2: NSRR Alternative

Under this alternative, long-term automobile energy consumption would be expected to be 200 bBTU less than the No Build. Diesel bus energy consumption would be expected to be 23 bBTU more than the No Build. Hybrid bus energy consumption would be expected to be 2 bBTU more than the No Build. LRT energy expenditures are forecasted to be approximately the same as the No Build. BRT energy consumption would be expected to be 405 bBTU more than the No Build. Overall, energy consumption would be expected to be approximately 230 bBTU more than the No Build alternative.

#### ALTERNATIVE 3: Hilltop Alternative

Under this alternative, long-term automobile energy consumption would be expected to be 200 bBTU less than the No Build. Diesel bus energy consumption would be expected to be 21 bBTU more than the No Build. Hybrid bus energy consumption would be expected to be 2 bBTU more than the No Build. LRT energy expenditures are forecasted to be approximately the same as the No Build. BRT energy consumption would be expected to be 427 bBTU more than the No Build. Overall, energy consumption would be expected to be approximately 250 bBTU more than the No Build alternative.

### 5.10.5 Construction Impacts

Additional energy consumption would be associated with construction of the planned project improvements under the build alternatives. The construction-related fuel expenditure is a one-time irretrievable commitment of energy resources.

Energy to construct the build alternatives may be associated with:

- ~ Vehicle fuel (diesel and gasoline) for construction machinery performing work;
- ~ Vehicle fuel for deliveries and hauling materials to and from the project site;
- ~ Fuel and electricity for construction equipment other than vehicles; and
- ~ Energy used to manufacture materials.

For both LRT and BRT, the construction of Alternative 1A would require the least amount of energy, as the length of construction (3 miles) is less than the other alternatives under consideration. For both LRT and BRT, the construction of Alternative 3 would require the most amount of energy, as this build alternative has the longest length of construction and the greatest number of proposed stations. Alternative 3 also involves road and guideway construction of Laskin Road through the Hilltop area, which has a greater scope than construction along the former NSRR ROW. Traffic impacts would be expected to be greater during construction on Laskin Road, which would decrease overall vehicle fuel efficiency due to idling in congested work zones. Generally, construction of the LRT alternatives would require more energy than the BRT alternatives, as the LRT involves construction of traction power system elements that are not required for the BRT build alternatives.

### 5.10.6 Indirect Effects

Given the regional scale of the energy assessment and the data used in the travel demand model for the project, the long-term indirect effects of the proposed project are accounted for in the build alternative analysis provided in **Section 5.10.4**.



5.10.7 Avoidance, Minimization, Mitigation, and Compensation

Most of the LRT alternatives would consume less energy compared to the No Build alternative due to the shift in travel modes from cars to rail transit. The BRT alternatives would increase compared to the No Build alternative as a result of the amount of energy consumed by the BRT vehicles combined with a smaller reduction in mode shift that does not offset the increase in transit energy use. However, it is anticipated that the current capacity of the electric service infrastructure can accommodate the energy demand associated with any of the alternatives. The proposed vehicle storage and maintenance facility would incorporate energy-efficient materials and practices according to HRT’s policies on environmental sustainability. Thus, no additional mitigation measures would be needed for the VBTES project.

During the construction period there are several conservation measures that could be undertaken to minimize project energy expenditures, including:

- ~ Avoid unneeded idling of construction equipment and vehicles;
- ~ Consolidate material delivery and trucking;
- ~ Use energy efficient vehicles and equipment;
- ~ Maintain equipment in good working condition;
- ~ Encourage ride sharing and carpooling for employees and contractors; and
- ~ Schedule delivery of materials outside of peak traffic periods to maximize fuel efficiency and minimize fuel consumed during traffic congestion.





# Chapter 6 | Environmental Justice

Chapter 6





6.0 Environmental Justice

This section describes the legal and regulatory context for considering environmental justice as part of capital infrastructure projects, the methods used to identify minority and/or low-income populations residing within the VBTES Corridor, and the results of the assessment of potential environmental issues as they pertain to environmental justice.

6.1 Legal and Regulatory Context

Executive Order 12898, entitled “Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations,” requires federal agencies to identify and address, as appropriate, any potential impacts of their capital programs, policies, or activities that may result in an adverse and/or disproportionately high impact borne by minority and/or low-income populations. This order provides, in part:

*To the greatest extent practicable and permitted by law each federal agency shall make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities on minority populations and low-income populations [Subsection 1–101].*

*Each federal agency shall conduct its programs, policies, and activities that substantially affect human health or the environment, in a manner that ensures that such programs, policies, and activities do not have the effect of excluding persons (including populations) from participation in, denying persons (including populations) the benefits of, or subject persons (including populations) to discriminations under such programs, policies, and activities, because of their race, color, or national origin [Subsection 2-2].*

*Each federal agency shall work to ensure that public documents, notices, and hearings relating to*

*human health or the environment are concise, understandable, and readily accessible to the public [Subsection 5-5 {c}].*

A Presidential Memorandum that accompanied Executive Order 12898 emphasized that the order was “intended to promote nondiscrimination in federal programs substantially affecting human health and the environment, and to provide minority communities and low-income communities access to public information on, and an opportunity for public participation in, matters relating to human health or the environment” (Weekly Compilation of Presidential Documents at 279, February 11, 1994). The Executive Order also underscored the application of certain provisions of existing law, such as NEPA, for the consideration of impacts to populations as the result of a federal action. Specifically, the memorandum notes that a NEPA analysis must discuss “effects on minority communities and low-income communities,” and that mitigation measures “should address significant and adverse environmental effects of proposed federal actions on minority communities and low-income communities” [Subsection 5-5 {c}].

In August 2012, the FTA issued Circular 4703.1, “Environmental Justice Policy Guidance for Federal Transit Administration Recipients”. The circular outlines the steps for determining the presence of environmental justice communities and evaluating potential impacts to these communities as a result of a capital infrastructure project. The guiding principles of environmental justice followed by the FTA as outlined in the circular include:

- ~ Avoid, minimize, or mitigate disproportionately high and adverse human health or environmental effects, including social and economic effects, on minority and low-income populations;
- ~ Ensure the full and fair participation by all potentially affected communities in the transportation decision-making process; and
- ~ Prevent the denial of, reduction in, or significant delay in the receipt of benefits by minority and low-income populations.

6.2 Methodology

Potential effects of the project to minority and/or low-income populations were only evaluated for the build alternatives, as the No Build alternative would not alter the existing conditions of the surrounding environment. The identification and analysis of minority and low-income populations used U.S. Census Bureau data to quantify population characteristics and also incorporates a qualitative discussion of potential effects to surrounding communities and environmental resources with respect to minority and low-income populations. The method for analyzing the effects of the proposed project on environmental justice populations consists of the following steps:

- ~ Define the unit of geographic analysis impacted by the proposed project. The boundaries of the geographic unit should be large enough to include the area likely to experience adverse effects but not so large as to artificially dilute or magnify the potentially impacted minority and/or low-income population;
- ~ In order to compare and evaluate potential effects to minority and/or low-income populations residing within the VBTES Corridor, a Region of Comparison (ROC) was established. For this project, the City of Virginia Beach was selected as the ROC.
- ~ Gather the relevant demographic data from a reliable source such as the U.S. Census Bureau at the Census block group geographic level;
- ~ Analyze the severity of impacts associated with the project alternatives;
- ~ Identify appropriate mitigation strategies to avoid or minimize identified impacts;
- ~ Identify the project benefits; and
- ~ Determine and disclose disproportionately high or adverse impacts (if any).

The presence of minority and/or low-income populations within the project corridor was based on the 2010 U.S. decennial Census, along with data obtained from the 2007–2011 American Community Survey (ACS).

USDOT Order 5610.2(a) defines disproportionately high and adverse effects on minority and/or low-income populations as an adverse effect that:

- ~ Is predominantly borne by a minority population and/or a low-income population, or
- ~ Will be suffered by the minority population and/or low-income population and is appreciably more severe or greater in magnitude than the adverse effect that will be suffered by the non-minority population and/or non-low-income population.

The identification and avoidance of whether a project will have disproportionately high and adverse environmental effects on minority and low-income populations depends on a number of factors, including:

1. Identifying and evaluating environmental, public health, and interrelated social and economic benefits;
2. Proposing measures to avoid, minimize and/or mitigate the negative effects of the project, and provide offsetting benefits and opportunities to enhance communities, neighborhoods, and individuals potentially impacts;
3. The alternatives considered; and
4. The public involvement process itself.

Potential beneficial and adverse impacts, as identified in this DEIS, were examined in the following critical areas:

- ~ Transportation, including roads and traffic, transit, pedestrian and bicycle access, and parking.
- ~ Social Effects, including land use, socioeconomics, economic development, acquisitions and displacements, cultural resources, parklands, visual quality, and safety and security
- ~ Environmental effects, including soils, water resources, wetlands, floodplains, navigable waterways, habitat and threatened and endangered species, noise, vibration, and air quality.
- ~ Short-term construction impacts.



In making determinations as to whether any build alternative will have “disproportionately high and adverse environmental effects” on minority and/or low-income populations, mitigation and enhancement measures that would be incorporated into the project, and all offsetting benefits to affected minority and/or low-income populations, may be taken into account, as well as design, comparative impacts, and the relevant number of similar existing system elements in non-minority and non-low-income areas.

If adverse impacts of the project would fall disproportionately on minority and/or low-income populations, additional mitigation measures beyond those already identified may be required. If strategies cannot be taken to adequately mitigate the identified impacts, then selection of an alternative with less adverse impacts may need to be considered.

6.2.1 Identification of Area of Analysis for Environmental Justice

The identification of minority and low-income populations within the VBTES Corridor was conducted through an analysis of Census block groups within a one-half mile radius of each build alternative using the following method:

- ~ A one half-mile radial buffer was created using Geographic Information Systems (GIS) software around each proposed build alternative alignment for the four alternatives considered. The alternatives included the following:
- ~ All Census block groups that intersected the one-half mile buffer of each build alternative were selected for analysis.

6.2.2 Method for Identifying Minority Census Block Groups

Advisory Circular 4703.1 defines a “minority person” as any of the following:

- ~ American Indian and Alaskan Native, which refers to people having origins in any of the original peoples of North and South America (including Central America), and who maintain tribal affiliation or community attachment;

- ~ Asian, which refers to people having origins in any of the original peoples of the Far East, Southeast Asia, or the Indian subcontinent;
- ~ Black or African-American, which refers to peoples having origins in any of the Black racial groups of Africa;
- ~ Hispanic or Latino, which includes persons of Cuban, Mexican, Puerto Rican, South or Central American, or other Spanish culture or origin, regardless of race, and
- ~ Native Hawaiian and Other Pacific Islander, which refers to people having origins in any of the original peoples of Hawaii, Guam, Samoa, or other Pacific Islands.

In accordance with the recommended guidelines outlined in AC 4703.1, the following process was used to identify those Census block groups in the VBTES Corridor that are populated by minorities:

- ~ According to data obtained from the 2010 decennial Census, the minority population percentage for the City of Virginia Beach was 35.5 percent.
- ~ The minority population percentage for each Census block group within the VBTES Corridor was calculated with the obtained Census data. If the minority population percentage of a Census block group was equal to or greater than the City of Virginia Beach percentage (35.5 percent), that Census block group was identified as a minority Census block group.

A minority population is defined as “any readily identifiable group of minority persons who live in geographic proximity and, if circumstances warrant, geographically dispersed/transient populations (such as migrant workers or Native Americans) who will be similarly affected by a proposed USDOT program, policy, or activity.”

6.2.3 Method for Identifying Low-Income Census Units

In accordance with AC 4703.1, and pursuant to the definition of low-income populations contained in Public Law 121-141, Moving Ahead for Progress in the 21<sup>st</sup> Century (MAP-21), low-income populations are defined as persons

or a group of people and/or community with household incomes at or below 150 percent of the U.S. Department of Health and Human Services (HHS) poverty guidelines. The HHS specifies a variety of different poverty levels, and bases poverty thresholds with respect to average family size. For the purpose of this analysis, average household size was supplemented for average family size; however, the threshold for average family size was retained and used for this analysis. For calendar year 2013, the Federal Poverty Guidelines (FPG) for a single individual was \$11,490. At the 150 percent level, the FPG for a single individual was \$17,235. **Table 6.2-1** outlines the FPG thresholds for family size relative to annual income for both 100 percent and 150 percent of the federal poverty level.

In place of previous methods used by the U.S. Census Bureau to collect information on population income levels, the American Community Survey (ACS), a revolving annual survey of the population that provides greater detail on changing demographic trends is now used to estimate the number of people who are or may be impoverished based on the federal poverty guidelines. In order to identify the number of persons living at or below 150 percent of the FPG using ACS data, Census block group geographic level data on average household size and average household income were collected for the study area. The average household income is produced in a series of incremental income ranges. The data reflect the number of households at the various income ranges within each block group (e.g., 100

Table 6.2-1 | 2013 Federal Poverty Guidelines

Size of Family	100 percent Poverty Level	150 percent Poverty Level
1	\$11,490	\$17,235
2	\$15,510	\$23,265
3	\$19,530	\$29,295
4	\$23,550	\$35,325
5	\$27,570	\$41,355
6	\$31,590	\$47,385
7	\$35,610	\$53,415
8	\$39,630	\$59,445

Source: U.S. Department of Health and Human Services, 2013 Federal Poverty Guidelines

households with incomes between \$25,000 and \$30,000). Average household size was rounded to the nearest whole number (e.g., an average household size of 3.2 persons per household was rounded down to 3). Using the FPG for family size provided by HHS, the number of households within each applicable income range were summed for each block group. For example, a family of 3 at or below 150 percent of the federal poverty level had a household income of no more than \$29,295 in 2013. Therefore, using the rounded average household size for each block group, the number of households were summed for each income range up to the 2013 FPG for household size. To determine the percent of households at or below 150 percent of the FPG, the number of households determined in the previous step were divided by the total number of households within the block group, and multiplied by 100 (yielding the percentage of households within the block group at or below 150 percent of the FPG). Finally, to determine the number of individuals at or below 150 percent of the FPG, the percentage of households determined in the previous step was multiplied by the average household size for each block group. A similar process was used to determine the percentage of the population for the City of Virginia Beach at or below 150 percent of the FPG.

6.3 Existing Conditions

A total of 69 Census block groups intersected a one-half mile buffer encircling the build alternatives. **Appendix P** to this DEIS contains additional details including the block groups used in the analysis of minority and low-income populations.

**Table 6.3-1** displays the percentages of minorities and low-income populations residing within one half-mile of each build alternative. The percentage of minority and low-income populations differs by alternative because each alternative serves slightly different geographic areas. The minority and low-income population numbers and percentages for the City of Virginia Beach are provided for comparison purposes.

As displayed in **Table 6.3-1**, the percentage of minority populations within one-half mile of Alternative 1A is slightly higher than the same percentages for Alternatives 1B, 2,

Table 6.3-1 | Summary of Minority Population and Poverty Status by Alternative

Alternative	Number of Block Groups	2010 Decennial Census			2007-2011 ACS 5-Year Estimates				
		Total Population	Minority Population	Percentage Minority	Total Population <sup>1</sup>	Estimated Number of Persons in Poverty <sup>2</sup>	Percent of Total Population	Zero-Car Households <sup>3</sup>	Percent of Total Households
Alternative 1A	18	21,779	8,464	38.9%	21,769	735	3.4%	428	5%
Alternative 1B	27	35,330	12,925	35.6%	34,984	1,117	3.2%	707	5%
Alternative 2	61	80,532	28,780	35.7%	78,552	2,335	2.9%	2,018	6%
Alternative 3	68	90,065	30,785	34.2%	87,628	2,614	2.9%	2,257	6%
City of Virginia Beach	301	437,994	155,524	35.5%	426,118	55,174	12.9%	6,665	4%

<sup>1</sup> The ACS is a revolving sample survey of the population intended to provide information more current information on population trends and conditions. As estimate data, it is necessary to establish a base population estimate, which is different than the 100% count of the population conducted by the decennial Census. Therefore, the reported Total Population under the 2007-2011 ACS 5-Year Estimate column will be different than the 100% count total.

Sources: U.S. Census Bureau, 2010 Decennial Census and 2007-2011 ACS 5-Year Estimates

<sup>2</sup> The estimated number of persons in poverty reflects the number of individuals identified as being at or below 150% of the Federal Poverty Guidelines, according to the income tables provided by the U.S. Department of Health and Human Services.

<sup>3</sup>Zero-car households provide an estimate of the number of persons who do not own a private vehicle and are considered transit dependent.

and 3 and the City of Virginia Beach in total. Similarly, the percentage of low-income populations residing within one-half mile of Alternative 1A was slightly higher than the number of low-income populations living within the same radial distance of Alternatives 1B, 2, and 3.

The study area contains a rich mixture of racial and ethnic groups, all of whom contribute to the unique character of the City of Virginia Beach. Race may be defined as a self-identification data item based on an individual’s perception of his or her racial identity. Respondents to the 2010 Census selected the race(s) with which they most closely identified themselves. Ethnicity is defined as the classification of a population that share common characteristics such as religion, cultural traditions, language, tribal heritage, or national origin. In the 2010 Census, population by race and ethnicity data, the Hispanic/Latino population is included in the following seven racial categories: White, Black or African-American, American Indian and Alaskan Native, Asian, Native Hawaiian and other Pacific Islander, Some Other Race, or Two or More Races.

Table 6.3-2 provides an overview of the racial and ethnic composition of populations surrounding each build alternative. As displayed by the data, non-Hispanic White populations comprise the largest racial group within

one-half mile of the build alternatives, followed by Black or African American populations.

As described in Table 6.3-1 and 6.3-2, Alternative 2 has the highest proportion of minority and/or low-income populations residing within one-half mile of the alternative’s alignment, while Alternative 3 had a lower proportion of minority and/or low-income populations. The percentage of minority populations within block groups residing within one-half mile of each build alternative ranges from 3.8 to approximately 73.9 percent. The percentage of low-income populations (those within incomes at or below 150 percent of the FPG) residing within block groups within one-half mile of each build alternatives ranges from 0.0 to 55.2 percent.

As shown in Figure 6.3-1 and Table 6.3-3 the VBTES corridor is located in an area of Virginia Beach that has areas identified as low-income and/or minority, except for a small number of census block groups near the Town Center of Virginia Beach and along sections of Laskin Road. Other areas within the study area that are neither minority or low-income include single-family residential neighborhoods south of the build alternatives along Parliament Drive and north of the build alternatives along Kings Grant Drive.

Table 6.3-2 | Race and Ethnicity by Build Alternative

Alternative	White (Non-Hispanic)	Black/African American	Native American	Asian	All Others <sup>1</sup>	Hispanic <sup>2</sup>	Totals <sup>3</sup>
Alternative 1A	13,315 (61.1%)	4,902 (22.5%)	103 (0.5%)	936 (4.3%)	812 (3.7%)	1,711 (8.1%)	21,779 (100%)
Alternative 1B	22,405 (63.4%)	7,324 (20.7%)	151 (0.4%)	1,377 (3.9%)	1,318 (3.7%)	2,755 (7.8%)	35,330 (100%)
Alternative 2	51,752 (64.3%)	16,392 (20.4%)	325 (0.4%)	2,598 (3.2%)	3,039 (3.8%)	6,426 (7.9%)	80,532 (100%)
Alternative 3	59,280 (65.8%)	17,349 (19.3%)	347 (0.4%)	2,810 (3.1%)	3,280 (3.6%)	6,999 (7.8%)	90,065 (100%)
City of Virginia Beach	282,470 (64.5%)	83,210 (18.9%)	1,349 (0.3%)	26,312 (6.0%)	15,666 (3.6%)	28,987 (6.6%)	437,994 (100%)

<sup>1</sup> The category “All Others” includes American Indian and Alaska Native, Native Hawaiian and other Pacific Islander, “some other race,” and persons who identified themselves as being of two or more races.

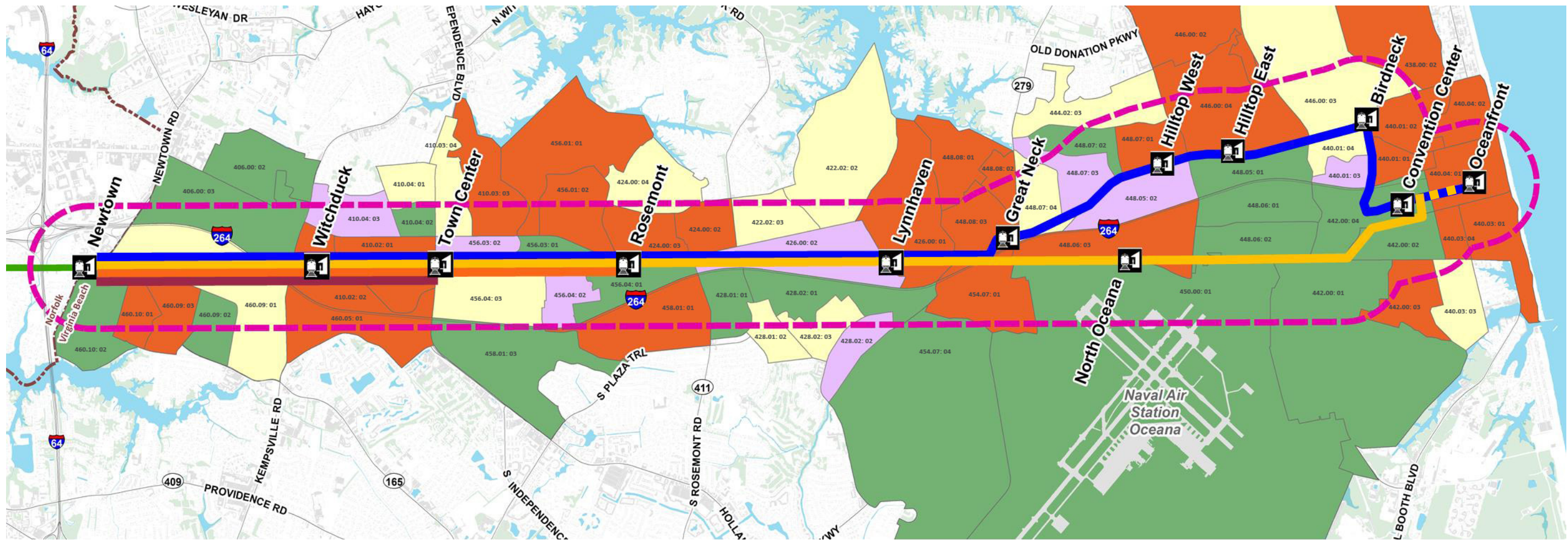
Source: U.S. Census Bureau, 2010

<sup>2</sup> By Census Bureau definition, the ethnic category “Hispanic or Latino” includes persons of any race.

<sup>3</sup> Any discrepancies with percentages of the totals shown are due to rounding.



Figure 6.3-1 | Block Group Specific Impacts by Alternative



Source: HDR, 2015

**Legend:**

Alternative 1A (Town Center)	Alternative 2 (NSRR)	Common Segment (Alternatives 2 & 3)	Norfolk LRT "The Tide"	Minority and Low-Income	Low-Income, Not Minority
Alternative 1B (Rosemont)	Alternative 3 (Hilltop)	Proposed Station Locations	1/2 Mile Buffer	Minority, Not Low-Income	Neither Minority or Low-Income



Table 6.3-3 | Block Group Specific Impacts by Alternative

Census Tract	Block Group	Population Statistics				Income Statistics			Alternative			
		Total Population	White (non-Hispanic)	Minority Population	Percentage Minority	Total Population <sup>1</sup>	Population in Poverty <sup>2</sup>	Determination	1A	1B	2	3
044808	3	1,196	817	379	31.7	1,190	44.3	Low-Income, Not Minority			•	•
040600	2	2,374	619	1,755	73.9	2,374	85.6	Minority and Low-Income	•	•	•	•
041002	1	1,202	780	422	35.1	1,202	72.0	Low-Income, Not Minority	•	•	•	•
041004	2	650	232	418	64.3	650	60.6	Minority and Low-Income	•	•	•	•
041004	1	940	708	232	24.7	940	22.3	Neither Minority or Low-Income	•	•	•	•
041004	3	1,041	647	394	37.8	1,041	0.0	Minority, Not Low-Income	•	•	•	•
041002	2	841	650	191	22.7	841	84.0	Low-Income, Not Minority	•	•	•	•
046010	1	808	669	139	17.2	808	56.7	Low-Income, Not Minority	•	•	•	•
042202	3	850	720	130	15.3	846	32.5	Neither Minority or Low-Income			•	•
042400	2	1,195	795	400	33.5	1,195	64.7	Low-Income, Not Minority		•	•	•
044003	1	964	773	191	19.8	819	45.7	Low-Income, Not Minority			•	•
044004	1	1,253	964	289	23.1	1,238	47.8	Low-Income, Not Minority			•	•
042600	1	1,010	833	177	17.5	933	32.5	Low-Income, Not Minority			•	•
042600	2	1,478	865	613	41.5	1,478	27.0	Minority, Not Low-Income			•	•
042802	3	788	522	266	33.8	788	19.6	Neither Minority or Low-Income			•	•
044004	2	816	700	116	14.2	816	53.2	Low-Income, Not Minority			•	•
043800	2	808	772	36	4.5	808	39.6	Low-Income, Not Minority				•
044001	1	1,266	986	280	22.1	1,266	35.1	Low-Income, Not Minority			•	•
044600	4	1,625	1,515	110	6.8	1,625	29.1	Low-Income, Not Minority				•

<sup>1</sup> The ACS is a revolving sample survey of the population intended to provide information more current information on population trends and conditions. As estimate data, it is necessary to establish a base population estimate, which is different than the 100% count of the population conducted by the decennial Census. Therefore, the reported Total Population under the 2007-2011 ACS 5-Year Estimate column will be different than the 100% count total.

Census Tract	Block Group	Population Statistics				Income Statistics			Alternative			
		Total Population	White (non-Hispanic)	Minority Population	Percentage Minority	Total Population <sup>1</sup>	Population in Poverty <sup>2</sup>	Determination	1A	1B	2	3
044600	2	1,843	1,706	137	7.4	1,388	64.2	Low-Income, Not Minority				•
040600	3	1,387	719	668	48.2	1,387	38.1	Minority and Low-Income	•	•	•	•
045601	1	933	877	56	6.0	933	45.0	Low-Income, Not Minority		•	•	•
045603	1	706	440	266	37.7	706	65.0	Minority and Low-Income		•	•	•
044600	3	814	783	31	3.8	814	10.0	Neither Minority or Low-Income				•
044808	2	651	493	158	24.3	651	61.6	Low-Income, Not Minority			•	•
044807	2	2,449	1,289	1,160	47.4	2,444	86.0	Minority and Low-Income		•	•	•
044806	1	2,081	770	1,311	63.0	2,070	54.2	Minority and Low-Income			•	•
044806	2	936	572	364	38.9	936	1.1	Minority and Low-Income			•	•
044807	3	1,726	1,003	723	41.9	1,726	26.4	Minority, Not Low-Income			•	•
044808	1	2,139	1,448	691	32.3	2,139	34.6	Low-Income, Not Minority			•	•
045407	4	866	550	316	36.5	866	54.1	Minority and Low-Income			•	•
046009	1	1,055	935	120	11.4	1,055	31.2	Neither Minority or Low-Income	•	•	•	•
045603	2	983	582	401	40.8	983	0.0	Minority, Not Low-Income	•	•	•	•
045604	3	2,286	1,486	800	35.0	2,283	24.1	Neither Minority or Low-Income		•	•	•
042202	2	1,754	1,536	218	12.4	1,713	22.1	Neither Minority or Low-Income			•	•
045604	2	2,552	1,373	1,179	46.2	2,431	21.8	Minority, Not Low-Income			•	•
045801	3	1,226	621	605	49.3	1,226	32.4	Minority and Low-Income	•	•	•	•

<sup>2</sup> The estimated number of persons in poverty reflects the number of individuals identified as being at or below 150% of the Federal Poverty Guidelines, according to the income tables provided by the U.S. Department of Health and Human Services.

Source: HDR, 2014

Table 6.3-3 | Block Group Specific Impacts by Alternative

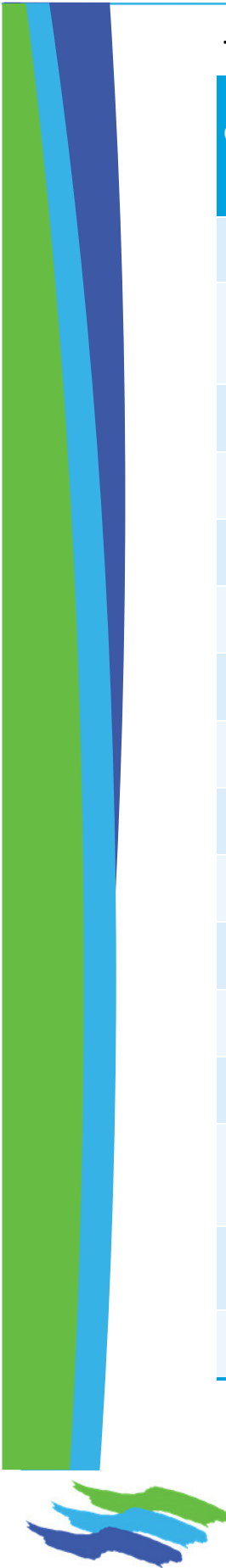
Census Tract	Block Group	Population Statistics				Income Statistics			Alternative			
		Total Population	White (non-Hispanic)	Minority Population	Percentage Minority	Total Population <sup>1</sup>	Population in Poverty <sup>2</sup>	Determination	1A	1B	2	3
044200	1	1,784	1,128	656	36.8	1,784	39.3	Minority and Low-Income			•	•
044003	3	1,401	1,293	108	7.7	1,401	21.6	Neither Minority or Low-Income			•	
045604	1	1,497	548	949	63.4	1,497	55.0	Minority and Low-Income		•	•	•
045407	1	1,334	1,066	268	20.1	1,334	56.6	Low-Income, Not Minority			•	•
044806	3	741	480	261	35.2	741	42.3	Low-Income, Not Minority	•	•	•	•
045601	2	1,862	1,377	485	26.0	1,862	50.1	Low-Income, Not Minority		•	•	•
045801	1	2,205	1,651	554	25.1	2,087	47.6	Low-Income, Not Minority		•	•	•
045000	1	1,298	712	586	45.1	97	1.1	Minority and Low-Income			•	•
044001	2	1,984	1,467	517	26.1	1,984	36.0	Low-Income, Not Minority			•	•
044003	4	874	620	254	29.1	874	57.4	Low-Income, Not Minority			•	•
046005	1	774	519	255	32.9	774	1.1	Low-Income, Not Minority	•	•	•	•
046009	3	1,041	797	244	23.4	1,041	39.7	Low-Income, Not Minority	•	•	•	•
046009	2	1,481	878	603	40.7	1,478	42.5	Minority and Low-Income	•	•	•	•
044001	4	1,209	895	314	26.0	1,209	8.0	Neither Minority or Low-Income				•
044805	1	1,187	698	489	41.2	1,187	41.8	Minority and Low-Income			•	•
044805	2	2,090	1,317	773	37.0	2,090	13.0	Minority, Not Low-Income			•	•

<sup>1</sup> The ACS is a revolving sample survey of the population intended to provide information more current information on population trends and conditions. As estimate data, it is necessary to establish a base population estimate, which is different than the 100% count of the population conducted by the decennial Census. Therefore, the reported Total Population under the 2007-2011 ACS 5-Year Estimate column will be different than the 100% count total.

Census Tract	Block Group	Population Statistics				Income Statistics			Alternative			
		Total Population	White (non-Hispanic)	Minority Population	Percentage Minority	Total Population <sup>1</sup>	Population in Poverty <sup>2</sup>	Determination	1A	1B	2	3
041003	3	725	595	130	17.9	725	60.0	Low-Income, Not Minority	•	•	•	•
041003	4	641	496	145	22.6	641	27.1	Neither Minority or Low-Income	•	•	•	•
042400	4	1,299	1,140	159	12.2	1,299	31.2	Neither Minority or Low-Income		•	•	•
042400	3	1,302	889	413	31.7	1,205	1.1	Low-Income, Not Minority		•	•	•
042802	1	1,951	635	1,316	67.5	1,941	96.4	Minority and Low-Income			•	•
042802	2	1,810	1,105	705	39.0	1,810	13.4	Minority, Not Low-Income			•	•
042801	2	989	694	295	29.8	989	34.7	Neither Minority or Low-Income			•	•
042801	1	1,325	806	519	39.2	1,314	45.6	Minority and Low-Income			•	•
044001	3	1,076	694	382	35.5	1,076	18.1	Minority, Not Low-Income			•	•
044200	4	1,136	405	731	64.3	1,129	67.2	Minority and Low-Income			•	•
044807	4	781	675	106	13.6	781	11.3	Neither Minority or Low-Income			•	•
046010	2	2,324	1,382	942	40.5	2,320	57.6	Minority and Low-Income	•	•	•	•
044200	2	2,511	1,014	1,497	59.6	2,405	1.4	Minority and Low-Income			•	•
044402	3	1,380	1,177	203	14.7	1,380	17.3	Neither Minority or Low-Income				•
044807	1	806	684	122	15.1	806	46.0	Low-Income, Not Minority				•
044200	3	1,156	986	170	14.7	1,156	30.0	Low-Income, Not Minority			•	•

<sup>2</sup> The estimated number of persons in poverty reflects the number of individuals identified as being at or below 150% of the Federal Poverty Guidelines, according to the income tables provided by the U.S. Department of Health and Human Services.

Source: HDR, 2014



## 6.4 Effects to Low Income and Minority Populations

The build alternatives considered would improve transit access between the residential, commercial, and activity centers within the VBTES Corridor and the greater Hampton Roads metropolitan region. The alternatives traverse between three and six of the City's Strategic Growth Areas (SGAs), areas designated through local land use planning for transit-oriented development. The SGA master plans call for sustainable development practices, integrating high quality well designed workforce housing with other uses to create higher density mixed-use developments with a neighborhood center, improved pedestrian and trail facilities, and a street and block structure created to accommodate development and mobility. Residents within the project study area would have direct access to the new, expedient transit service, linking neighborhoods and communities with area employment centers and recreational amenities. Project benefits to minority and/or low-income populations living in the area include more transportation choices, direct access to employment opportunities, and potential for job creation and affordable workforce housing through economic revitalization.

Construction of any build alternatives would represent a substantial long-term capital investment in transit service and facilities serving the project study area as well as increased span of service and frequency of service for fixed route bus service throughout the City. Increased transit access to employment and activity centers would benefit all area populations, regardless of socioeconomic status. However, potential long-term impacts to minority and low-income communities may differ by alternative as discussed in **Chapters 3, 4, and 5** of this DEIS. Because of the location of the former NSRR ROW in context with the surrounding development patterns and the demographics of Virginia Beach, most of the direct impacts resulting from the project's build alternatives (albeit a small number in total) would be in low income and/or minority census tracts. The following discussion provides a comparison of potential impacts on minority and low-income communities from the implementation of the proposed build alternatives. During preliminary engineering and the FEIS process, HRT, FTA, and

the City of Virginia Beach are committed to working with low income and minority communities to further identify specific areas of concern to low income and minority populations along the corridor. Following this additional outreach during the FEIS, a determination will be made if the impacts are disproportionate. Below is a preliminary comparison of the impacts from the build alternatives on low income and minority populations.

- ~ **Transportation** – Improved transit service, including a more tightly integrated regional bus system from the build alternatives would result in improved mobility of minority and low-income populations.

The number of intersections operating at an unacceptable level of service (LOS E or F) in the 2034 Build condition are listed in **Table 6.4-1**. For the LRT and BRT build alternatives, all of the intersections where LOS E or F conditions would occur are within or adjacent to low income or minority areas.

- ~ **Land Use and Economic Development** – The build alternatives have the potential to stimulate development and redevelopment and create additional jobs providing a community-wide benefit. Roadway improvements required to safely operate Alternatives 1B, 2, and 3 through the Thalia community would require the closure of Fir Avenue and Budding Avenue. These closures would change access patterns in the community and have the potential to increase traffic on Thalia Road and Southern Boulevard. The direct and indirect effect of these closures will be studied should Alternative 1B, 2, or 3 be selected as the LPA.

- ~ **Acquisitions and Displacements** – As shown in **Table 6.4-1**, most of the potential acquisitions and displacements related to the build alternatives would occur in low income or minority block groups but would not require any residential displacements. All of the commercial acquisitions would occur in well established commercial areas. The residential displacements required for the LRT version of Alternative 3 would not occur in a low income or minority block group. Partial acquisitions are generally small areas and would occur throughout the VBTES Corridor.

- ~ **Cultural Resources** – Impacts to cultural resources have not been finalized. After the selection of a locally preferred alternative, final surveys and impact assessments will be completed.

- ~ **Parklands** – No adverse impacts to parks would occur as a result of any of the build alternatives.

- ~ **Visual Quality** – No adverse impacts to parks would occur as a result from any of the build alternatives.

- ~ **Safety and Security** – No impacts to safety and security would occur as a result of the build alternatives.

- ~ **Noise and Vibration** – Moderate and severe noise impacts may occur in minority or low-income communities without mitigation. As shown in **Table 6.4-1**, Light rail Alternatives 1A and 1B would have a moderate impact on one receptor and a severe impact on four receptors in block groups with above average numbers of low income or minority households. Light rail Alternative 2 would have a moderate impact to eight receptors and a severe impact to four receptors. Light rail Alternative 3 would have a moderate impact to three receptors and a severe impact to four receptors in environmental justice areas. This is compared to one receptor with moderate impacts for LRT Alternative 1A, three receptors with moderate impacts for LRT Alternatives 1B, 2, and 3, and five receptors with severe impacts in non-environmental justice areas for all four light rail alternatives.

BRT Alternatives 1A and 1B would have one receptor with a moderate noise impact, and this is located in a non-environmental justice area. BRT Alternatives 2 and 3 would have one receptor with a moderate noise impact located in a low-income block group and one receptor in a non-environmental justice area. The BRT alternatives would have no severe noise impacts to any receptors. HRT will work with the affected households and business to lower the noise levels to below severe impact thresholds in all cases.

- ~ **Soils and Farmland** – No adverse impacts to soils or farm lands would occur as a result of the build alternatives.

- ~ **Surface Water, Groundwater, and Water Quality** – No adverse impacts would occur as a result of any of the build alternatives.

- ~ **Habitat and Wildlife** – No adverse impacts would occur as a result of any of the build alternatives.

- ~ **Hazardous Regulated Materials** – Construction of any of the transit alternatives may require the cleanup of known and unknown contaminated sites.

- ~ **Energy** – No adverse impacts to energy use would occur as a result of the build alternatives.

- ~ **Air Quality** – The build alternatives would have negligible impacts on air quality in the VBTES Corridor.

Table 6.4-1: Impacts to Environmental Justice Communities by Alternative

	ALTERNATIVE															
	LRT ALTERNATIVES								BRT ALTERNATIVES							
	1A		1B		2		3		1A		1B		2		3	
	Town Center		Rosemont		NSRR		Hilltop		Town Center		Rosemont		NSRR		Hilltop	
	Low-Income or Minority Areas	Total	Low-Income or Minority Areas	Total	Low-Income or Minority Areas	Total	Low-Income or Minority Areas	Total	Low-Income or Minority Areas	Total	Low-Income or Minority Areas	Total	Low-Income or Minority Areas	Total	Low-Income or Minority Areas	Total
TRANSPORTATION IMPACTS																
<i>Intersections operating below acceptable Level of Service in forecast year (2034 Build, AM or PM Peak)</i>	3	3	5	5	7	7	8	8	3	3	5	5	7	7	8	8
SOCIAL IMPACTS																
<i>Total Acquisitions</i>	6	12(13)	13	20	22	29	36	47	5	9(10)	12	17	18	23	30	35
<i>Partial Acquisitions</i>	7	12	8	13	42	47	80	101	6	6	6	6	19	19	41	50
<i>Residential or Business Displacements</i>	5	7	5	7	29	31	29	53	5	7	5	7	27	29	25	39
ENVIRONMENT IMPACTS																
<i>Severe Noise Impacts</i>	3	8	3	8	4	9	4	9	0	0	0	0	0	0	0	0
<i>Moderate Noise Impacts</i>	1	2	1	4	8	11	3	6	0	1	0	1	1	2	1	2



# Chapter 7 | Section 4(f) Involvement

Chapter 7





## 7.0 Section 4(f) Involvement

### 7.1 Legal and Regulatory Context

Section 4(f) of the Department of Transportation Act of 1966 (49 U.S.C. 303) declares that it is national policy to make a special effort to preserve the natural beauty of the countryside, publicly owned parks, recreation areas, wildlife or waterfowl refuges, or any historic sites of national, state, or local significance. FTA/FHWA share regulations at 23 CFR Part 774. FTA follows FHWA's Section 4(f) Policy Paper from 2012.

A Section 4(f) statement is prepared when a transportation project has the potential to use land from a publicly-owned park, recreation area, wildlife or waterfowl refuge, or any historic site that is listed on or eligible for the National Register of Historic Places. Section 4(f) permits the use of such land for a transportation project only when the Federal Transit Administration (FTA) has determined that there is no feasible or prudent alternative to such use and the project includes all possible planning to minimize harm to the resource resulting from such use or FTA determines that there would be a *de minimis* impact to the property.

### 7.2 Methodology

#### 7.2.1 Use

Use of Section 4(f) land occurs when land is permanently incorporated into a transportation facility, when there is a temporary occupancy of Section 4(f) land that does not meet the exception in 23 CFR 774.13(d), and when there is a "constructive use" of Section 4(f) land. Land that is permanently incorporated into a transportation facility can be done by fee simple purchase of the land or through permanent right-of-way acquisition. In order for temporary occupancy to not constitute a use, the following conditions listed in 23 CFR 774.13(d) must be met:

- ~ the duration of the occupancy must be less than the time needed for the construction of the project and there must not be a change in ownership;

- ~ both the nature and magnitude of the changes to the Section 4(f) resources are minimal;
- ~ there are no anticipated permanent adverse physical changes nor interference with activities or purposes of the resource on a temporary or permanent basis;
- ~ the land is restored to the same or better condition; and
- ~ there is a documented agreement of the appropriate Federal, State, or local officials having jurisdiction over the resource regarding the above conditions.

A constructive use of land occurs when the project does not require permanent or temporary use of land, but the proximity impacts are so severe that the protected activities, features, or attributes of the resource. Section substantially impaired. 23 CFR Part 774 of the Section 4(f) regulation states that a constructive use of land occurs when:

- ~ the projected noise level increase from the project substantially interferes with the use and enjoyment of a resource, i.e. interrupting a quiet setting when the setting is a recognizable feature of the resource;
- ~ the proximity of the proposed project impairs the aesthetic quality of a resource where these aesthetic qualities are considered important contributing elements to the value of a resource, i.e., obstructing or eliminating the primary views of an architecturally significant building;
- ~ a restriction on access diminishes the utility of a resource;
- ~ a vibration impact from the operation of a project impairs the use of a Section 4(f) resource or affects the structural integrity of a historic building or impairs its utility;
- ~ the project results in an intrusion into an ecological setting, which diminishes the value of a wildlife habitat in a wildlife or waterfowl refuge adjacent to a project.

#### 7.2.2 Determination of Alternatives

The determination of "feasible and prudent" alternatives must include supporting information that demonstrates unique problems or unusual factors involved in the use of alternatives which would avoid the use of Section 4(f) resources, or that the cost, social, economic, and environmental impacts or community disruption resulting from such alternatives reach extraordinary magnitudes. An alternative may be rejected as not being feasible and prudent if it:

- ~ compromises the project to a degree that it is unreasonable to proceed in light of the project's stated purpose and need (i.e., the alternative doesn't address the purpose and need of the project);
- ~ results in unacceptable safety or operational problems;
- ~ after reasonable mitigation, it still causes severe social, economic, or environmental impacts; severe disruption to established communities; severe or disproportionate impacts to minority or low-income populations; or severe impacts to environmental resources protected under other Federal statutes; It results in additional construction, maintenance, or operational costs of extraordinary magnitude;
- ~ causes other unique problems or unusual factors;
- ~ uses another Section 4(f) protected property;
- ~ involves multiple factors as outlined above that, while individually minor, cumulatively cause unique problems or impacts of extraordinary magnitude.

#### 7.2.3 De Minimis Impact

A *de minimis* impact involves the use of Section 4(f) property that is generally minor in nature. A *de minimis* impact is one that, after taking into account avoidance, minimization, mitigation and enhancement measures, results in no adverse effect to the activities, features, or attributes qualifying a park, recreation area, or refuge for protection under Section 4(f). For historic properties, a *de minimis* impact is one that results in a Section 106 determination of "no adverse effect" or "no historic

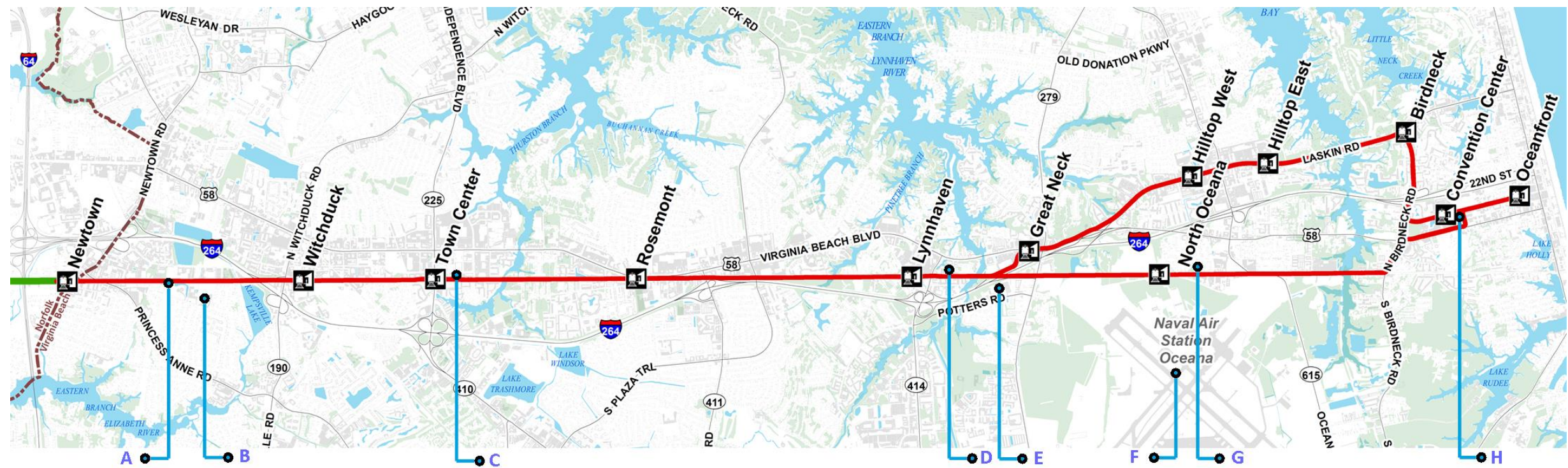
properties affected." A *de minimis* impact determination requires agency coordination with the officials having jurisdiction over the Section 4(f) property and opportunities for public involvement. A *de minimis* impact determination may not be made when there is a constructive use.

### 7.3 Identification of Section 4(f) Resources

There are five parks within or adjacent to the VBTES Corridor that are publicly owned and subject to the requirements of Section 4(f). In addition, there are three historic resources that are either listed in the National Register of Historic Places or have been determined eligible for listing and are thus subject to Section 4(f). These Section 4(f) resources are listed in **Table 7.3-1** and shown in **Figure 7.3-1**.

As outlined in **Section 4.4 Cultural Resources**, a Phase 1A Reconnaissance Survey was completed for the VBTES Corridor. The survey identified 516 above-ground properties that are potentially eligible for the National Register based on their age. It also identified 12 previously recorded archaeological sites. Five of these sites have been determined ineligible for the National Register; the National Register eligibility of the remaining seven sites has not been determined. As part of the FEIS, an archaeological survey and a full reconnaissance level architectural survey will be undertaken. If additional properties are determined eligible as part of this process, impacts to these resources will be assessed both within the FEIS and the Section 4(f) evaluation. Additional coordination with the VDHR will be undertaken during the FEIS stage and will include an evaluation of the National Register significance, including determination of project effects, should any resource be determined eligible.

Figure 7.3-1 | Section 4(f) Resources Within and Adjacent to the VBTES Corridor



Source: Fitzgerald & Halliday and HDR, 2013

Table 7.3-1 | Section 4(f) Resources within and adjacent to the VBTES Corridor (See Figure 7.3-1)

Map Key	Resource Name	Description	Section 4(f) Use
A	Norfolk and Virginia Beach Railroad	Initially constructed in 1883 by the Norfolk and Virginia Beach Railroad Improvement Company, the 18 mile long corridor traveled between Norfolk and the Virginia Beach oceanfront. Use of the Norfolk and Virginia Beach Railroad declined during the early to mid-20th century and became abandoned, though the railway infrastructure remained. In 2007, VDHR and VDOT determined the rail line eligible for inclusion in the National Register of Historic Places. The City of Virginia Beach purchased the portion of the railway within its city limits for a possible transit extension in 2010.	TBD
B	Point O'View Elementary School	Point O' View Elementary School is a kindergarten through 5th Grade public school located between Parliament Drive and Yoder Lane adjacent to the former NSRR ROW. It was built in 1966 and had 674 students during the 2013 - 2014 school year. It sits on approximately 11.9 acres. On-site before, during, and after-school recreation program activities occur on the school's active playing fields. The school's playing fields and recreation areas include four lighted baseball diamonds, three basketball courts, and a jungle gym.	No Use
C	Central Park	Central Park is located near the Virginia Beach Town Center commercial and residential development on approximately 4.2 acres south of Columbus Street and north of the former NSRR ROW. Amenities within Central Park include a pond, walking path, and several park benches. The park is accessible via a small parking lot from Columbus Street and connecting sidewalks.	No Use
D	Eureka Park	Eureka Park is a 1.2 acre neighborhood park at the corner of Southern Boulevard and Eureka Drive. The park is bordered by ranch style wooden fencing and includes a small picnic shelter, playground, and basketball court. Eureka Park is both a neighborhood and destination park considering its proximity to Virginia Beach Boulevard and Lynnhaven Parkway.	No Use
E	Upper Wolfsnare	This historic property is located at 2040 Potters Road north of the former NSRR ROW. Constructed in 1759 in the Georgian Style, Upper Wolfsnare is a white brick house located on three acres. The house is jointly owned by Princess Anne County and the Virginia Beach Historic Society. The property became listed on the National Register of Historic Places in 1975. Upper Wolfsnare House is occupied by private tenants with limited public viewing.	No Use
F	NAS Oceana Historic District	The NAS Oceana Historic District encompasses 5,916 acres in eastern Virginia Beach, roughly bounded by Potters Road to the north, Oceana Boulevard to the east, Dam Neck Road to the south, and London Bridge Road to the west. Initially composed of 328.95 acres purchased by the U.S. Government in 1940, the once small airfield has grown to become one of the nation's largest Navy installations. Eligible to be listed on National Register of Historic Places, NAS Oceana contains a blend of structures from the station's founding through present day. NAS Oceana is owned by the U.S. Navy.	TBD
G	Oceana Village Park	Oceana Village Park is a small park of approximately 0.2 acres located south of Streamline Drive in the Oceana Gardens neighborhood. The park primarily serves residents of the immediate neighborhood and is a place of passive recreation. Park amenities are a small picnic shelter, benches, and a jungle gym. The park is operated by the City of Virginia Beach.	No Use
H	Tidewater Veterans Memorial Park	Tidewater Veterans Memorial Park is located at 19th Street and Jefferson Avenue across from the Virginia Beach Convention Center. The 0.9 acre park is landscaped with trees and hedges, and benches are provided for users. The memorial was created through a collaboration with local students, artists, and architects to commemorate the service of military veterans in Hampton Roads. The memorial was dedicated on Memorial Day of 1988. The site is owned and operated by the City of Virginia Beach.	No Use

Source: Fitzgerald & Halliday and HDR, 2013

### 7.4 Evaluation of Section 4(f) Resources

#### 7.4.1 Historic Resources

The purpose of the reconnaissance-level survey conducted for this DEIS was to illustrate the historical context of the corridor and identify historic resources that have been previously studied in the area of potential effects. No detailed impact determination has been conducted for this DEIS. More detailed survey, evaluation, and assessment of effect will occur after selection of the preferred alternative.

#### 7.4.2 Parkland Resources

##### LRT Build Alternatives

##### ALTERNATIVE 1A: Town Center Alternative

Alternative 1A would border four parks or recreation areas between the Newtown Road Station and the proposed Constitution Drive option of the Town Center Station. The corridor would be adjacent to Parliament Park, a private park serving a residential complex and the Carolanne Farm Swim Club, a private pool facility. Alternative 1A would also border the recreational fields located behind Point O’View

Elementary School. The VBTES Corridor is also adjacent to the southern boundary of Central Park, a public pond and lawn area within the Town Center of Virginia Beach. No recreational property would be used for the operation and maintenance of this project.

Fencing would be installed on the transit right of way as required to separate the transit system from the parks and playing fields. No noise, vibration, or visual impacts are anticipated (see **Sections 4.6** and **5.8**). No permanent, temporary, or constructive use of parks or recreation facilities would occur as a result of Alternative 1A.

##### ALTERNATIVE 1B: Rosemont Alternative

Alternative 1B would have the same impacts as Alternative 1A. No additional parks are adjacent to the alternative between the Town Center Station and the Rosemont Station.

##### ALTERNATIVE 2: NSRR Alternative

Between the Newtown Road Station and Rosemont Station, Alternative 2 would have the same effects as Alternative 1B. For Alternative 2, east of Lynnhaven Parkway, the tracks would pass south of Eureka Park (a neighborhood park and playground). The park is separated from the tracks by

Table 7.4-1 | Section 4(f) Resources within and adjacent to the VBTES Corridor by Alternative (See Figure 7.3-1)

Map Key	Resource Name	Type of Facility	Location	Alternative							
				LRT ALTERNATIVES				BRT ALTERNATIVES			
				A Town Center	1B Rosemont	2 NSRR	3 Hilltop	1A Town Center	1B Rosemont	2 NSRR	3 Hilltop
A	Norfolk and Virginia Beach Railroad	Historic rail line (NRHP eligible)	Former NSRR ROW	Impact to be assessed in FEIS if selected as LPA	Impact to be assessed in FEIS if selected as LPA	Impact to be assessed in FEIS if selected as LPA	Impact to be assessed in FEIS if selected as LPA	Impact to be assessed in FEIS if selected as LPA	Impact to be assessed in FEIS if selected as LPA	Impact to be assessed in FEIS if selected as LPA	Impact to be assessed in FEIS if selected as LPA
B	Point O’View Elementary School	Active playing fields adjacent to school	Yoder Lane at former NSRR ROW	No 4(f) Use	No 4(f) Use	No 4(f) Use	No 4(f) Use	No 4(f) Use	No 4(f) Use	No 4(f) Use	No 4(f) Use
C	Central Park	Pond and park with walking path in urban setting	Market Street at former NSRR ROW	No 4(f) Use	No 4(f) Use	No 4(f) Use	No 4(f) Use	No 4(f) Use	No 4(f) Use	No 4(f) Use	No 4(f) Use
D	Eureka Park	Small neighborhood park in suburban setting	Southern Boulevard at Eureka Avenue	N/A	N/A	No 4(f) Use	No 4(f) Use	N/A	N/A	No 4(f) Use	No 4(f) Use
E	Upper Wolfsnare	Historic property (NRHP listed)	Potters Road north of former NSRR ROW	N/A	N/A	Impact to be assessed in FEIS if selected as LPA	Impact to be assessed in FEIS if selected as LPA	Impact to be assessed in FEIS if selected as LPA	Impact to be assessed in FEIS if selected as LPA	Impact to be assessed in FEIS if selected as LPA	Impact to be assessed in FEIS if selected as LPA
F	NAS Oceana Historic District	Historic district (NRHP eligible)	South of Potters Road	N/A	N/A	Impact to be assessed in FEIS if selected as LPA	Impact to be assessed in FEIS if selected as LPA	N/A	N/A	Impact to be assessed in FEIS if selected as LPA	Impact to be assessed in FEIS if selected as LPA
G	Oceana Village Park	Neighborhood park in suburban setting	South Streamline Drive	N/A	N/A	No 4(f) Use	N/A	N/A	N/A	No 4(f) Use	N/A
H	Tidewater Veterans Memorial Park	Memorial located in parking area adjacent to street in urban area	19 <sup>th</sup> Street at Jefferson Avenue	N/A	N/A	N/A	No 4(f) Use	N/A	N/A	N/A	No 4(f) Use

Source: Fitzgerald & Halliday and HDR, 2013

Southern Boulevard. Alternative 2 would form the southern boundary of Oceana Village Park, a neighborhood park and playground. Active rail transit service near Eureka Park and Oceana Village Park could present safety concerns for facility users that would require coordination with the parks' users, HRT, and the City of Virginia Beach. The alignment would run within the center lanes of 19<sup>th</sup> Street, and thus would not directly abut Tidewater Veterans Memorial Park. As such, there should be no safety concerns for park users. Overall, no permanent, temporary, or constructive use of parks or recreation facilities would occur as a result of Alternative 2.

#### ALTERNATIVE 3: Hilltop Alternative

Alternative 3 would have the same direct effects as Alternative 1B between the Newtown Road Station and Rosemont Station, and the effects to Eureka Park and Tidewater Veterans Memorial Park would be the same as those described for Alternative 2. No permanent, temporary, or constructive use of parks or recreation facilities would occur as a result of Alternative 3.

#### LRT VSMF

The LRT VSMF would be located on land owned by the City off of Potters Road, immediately north of the former NSRR ROW. The proposed facility would not impact parks or open space.

#### BRT Build Alternatives

All of the BRT Alternatives would be located along the previously described LRT alternatives' routes. The same impacts would occur along the BRT routes as described for the corresponding LRT alternatives. The BRT VSMF would be on the same land as the LRT VSMF and would not impact parks or open space.

## 7.5 Avoidance, Minimization, and Mitigation

### 7.5.1 Historic Resources

The LRT and BRT build alternatives have the potential to have an adverse impact on various resources that are listed or eligible to be listed on the National Register of Historic

Places. Since the impact determination has not been completed for this DEIS, the 4(f) use cannot be determined at this time.

### 7.5.2 Parkland Resources

As described in **Section 7.4.2**, there would be no permanent conversion of public parklands or recreation areas to a transportation purposes. However, until final construction plans, means, and methods have been established, the extent of temporary use is unknown. HRT and the City of Virginia Beach will endeavor to ensure that any short term need for parklands during construction will fall within the conditions listed in 23 CFR 774.13(d) such that the temporary occupancy would not constitute a 4(f) use. In addition to permanent and temporary uses, it is not anticipated that there would be any constructive use of parklands or recreation areas as defined by 23 CFR Part 774. During the FEIS and preliminary engineering, HRT and the City of Virginia Beach will collaborate to quickly establish strategies to mitigate any unanticipated impacts to parklands and recreation areas that are found to below the statutory constructive use standard.



# Chapter 8 | Public Involvement

Chapter 8





## 8.0 Public Involvement and Agency Coordination

This chapter describes the public and agency coordination efforts for the Virginia Beach Transit Extension Study. Public involvement includes all methods of outreach used to alert the public of the study, its alternatives, and its potential benefits and impacts.

In accordance with the National Environmental Policy Act (NEPA) of 1969 and with the applicable Council on Environmental Quality (CEQ) regulations for implementing NEPA (40 C.F.R. §1500 - 1508), it is important that those who are interested in or potentially affected by the study have an opportunity to share their concerns and provide input regarding the VBTES. HRT designed and is conducting a public participation program that includes outreach to those who live, work, or own property adjacent to any of the alternatives, the general public, local businesses, various associations, affected government agencies, and other stakeholders in Virginia Beach and Hampton Roads to effectively engage the public in the planning and impact assessment process.

All public comments and details associated with public involvement can be found in **Appendix L**.

### 8.1 Public and Agency Involvement

The goal of the public and agency involvement program and process is to engage a diverse group of public and agency participants, to solicit relevant input, and to provide timely information throughout the environmental review process. An informed local community and government leadership are critical to help make decisions regarding the impacts and implementation of a locally preferred alternative.

The affected community includes not only the residents in the VBTES Corridor, but also individuals, businesses, groups, and others interested in the study area. The planning process was structured and implemented to fully

disclose and discuss concerns and issues related to the project’s purpose and need, engineering solutions, social impacts, environmental impacts, economic effects, and other items of concern to the community. HRT began its VBTES public involvement process in 2009. It held frequent public meetings in 2010, 2012, 2013, and 2014 and continues to receive public comments on the study today.

#### 8.1.1 Public Outreach Activities and Information Exchange

Public and agency involvement activities were designed to coincide with major project milestones in order to provide relevant information to stakeholders throughout the study process. The public and agency involvement process is open so that interested parties have an opportunity to be involved in planning. Stakeholders had an opportunity to direct, review, and comment on the DEIS analysis and results at major milestones reached during the course of the study.

### 8.2 Agency Coordination

#### 8.2.1 Agency Coordination Plan

Throughout the DEIS process, Hampton Roads Transit (HRT) has coordinated with local, state, and federal agencies that oversee the management of natural resources in the project area. Since these agencies oversee impacts and issue permits regarding their resource areas, it is important to include them from project initiation throughout the life of the project. In this way, issues are identified early so that they can be properly considered and, if necessary, avoided, minimized, or mitigated as the project progresses.

#### 8.2.2 Agency Coordination Activities

Agencies were invited to participate in the planning process through invitation to become a lead agency or a participating agency. A revised Notice of Intent (NOI) to prepare an environmental impact statement for the Virginia Beach Transit Extension Study was submitted to the Federal Register by the Federal Transit Administration on August 14, 2013. This NOI restarted the study process as a DEIS and gave HRT permission to study transit extension alternatives from The Tide into the City of Virginia Beach.

FTA, the lead agency, is responsible for functions traditionally performed in preparing an Environmental Impact Statement (EIS). In addition, the lead agency identifies and involves participating agencies; develops coordination plans; provides opportunities for public and participating agency involvement in defining the purpose and need and determining the range of alternatives; and collaborates with participating agencies in determining methodologies and the level of detail for the analysis of the alternatives. The lead agency also provides increased oversight in managing the process and resolving issues.

A participating agency is a federal, state, or local government agency that has an interest in the VBTES and has agreed to participate in the review processes. Participating agencies play a critical role in defining the project and identifying issues of concern in areas such as purpose and need, range of alternatives, and methodologies. Participating agencies for the VBTES include:

#### Federal Agency



Federal Highway Administration



U.S. Coast Guard



U.S. Fish and Wildlife Service



U.S. Navy

#### State Agency



Virginia Department of Environmental Quality (VDEQ)



Virginia Department of Game and Inland Fisheries



Virginia Department of Rail and Public Transportation (VDRPT)



Virginia Department of Transportation



Virginia State Historic Preservation Office

An agency coordination meeting was held on September 9, 2009 with members of the project team and key regulatory agency representatives who were interested in the project. The purpose of the meeting was to provide the attendees with an understanding of the project’s purpose and to obtain agency input on the project. The agency representatives were invited to comment on issues of special concern along the VBTES Corridor. The agency comments were used, along with other transportation and environmental data and the analysis collected during the environmental studies, to help identify the purpose of the project, develop alternatives, and make decisions regarding the methodology for the alternative analysis.

Letters of notification were mailed on August 25, 2009 to about 40 city and state agencies representing interests in the VBTES. These letters invited agency representatives to attend the meeting, requested agency involvement as a cooperating or participating agency for the VBTES SDEIS, and solicited agency comments on the resources in the corridor. The following agencies sent representatives to attend the agency project initiation meeting for the VBTES:

- ~ Hampton Roads Transportation Planning Organization
- ~ U.S. Coast Guard, District 5
- ~ Virginia Department of Agriculture and Consumer Services
- ~ Virginia Department of Health

#### 8.2.3 Local Government Coordination

All local government agencies, special regulatory authorities, and civic leagues were invited to participate in the planning process. The study team actively engaged these parties by visiting their offices and presenting project information at organization meetings. Between June, 2009 to August, 2014, VBTES project updates were presented at meetings of the following local organizations:

- ~ Back Bay/Pungo Civic League
- ~ Benevolent Society
- ~ Birdneck Civic League
- ~ Cavalier Golf and Yacht Club
- ~ Cavalier Park/Bay Colony Civic League

- ~ Conference of Minority Transportation (COMTO) 2011
  - ~ April 26, 2011
- ~ Council of Civic Organizations 2013
  - ~ January 22, 2013
  - ~ February 19, 2013
- ~ Courthouse Rotary Club 2014
  - ~ January 14, 2014
  - ~ September 9, 2014
- ~ Hampton Roads Chamber of Commerce
- ~ Homestead Civic League
- ~ Kempsville Lions Club
- ~ Kempsville Ruritan Club
- ~ National Active and Retired Federal Employees Association
- ~ North Beach Civic League
- ~ Oceana Gardens Civic League
- ~ Princess Anne Plaza Civic League
- ~ Princess Anne Historical Society
- ~ Resort Advisory Committee (Transportation /Parking/ Pedestrian Committee)
- ~ Rotary Club of Princess Anne
- ~ Thoroughgood Civic League
- ~ Virginia Beach Historic Commission
- ~ Virginia Beach Mayor’s Commission on Aging
- ~ Wellington Woods Civic League
- ~ Witchduck Civic League

8.2.4 City Council Presentations

As of September 2014, HRT attended eight Virginia Beach City Council meetings to brief the Council on the status of the study at key project milestones. These public updates were used to inform City Council about the status of the project and allow for Council direction as necessary.

- 2009
  - ~ May 19, 2009
- 2010
  - ~ February 9, 2010
  - ~ June 15, 2010
  - ~ October 19, 2010
- 2011
  - ~ April 28, 2011
- 2013
  - ~ February 28, 2013
  - ~ May 23, 2013
  - ~ September 26, 2013
- 2014
  - ~ April 24, 2014
  - ~ August 27, 2014

8.2.5 Transportation District Commission of Hampton Roads (TDCHR) Updates

The TDCHR is HRT’s governing board. As of September 2014, project staff provided 14 updates on VBTES progress to the Planning and New Starts Committee of the TDCHR.

- 2009
  - ~ August 27, 2009
  - ~ September 24, 2009
  - ~ October 22, 2009
  - ~ December 10, 2009
- 2010
  - ~ February 25, 2010
  - ~ April 22, 2010
  - ~ July 22, 2010

8.2.6 Technical Advisory Committee

The use of a Technical Advisory Committee (TAC) provided a forum for representatives from local and regional agencies to provide input on technical methods and agency requirements. The TAC consists of staff from key organizations, including the City of Virginia Beach, HRT, Hampton Roads Transportation Planning Organization, Virginia Department of Transportation, Virginia Department of Rail and Public Transportation, Virginia Department of Environmental Quality, and other regulatory agencies.

The TAC provides a forum for discussing reliability of technical methods, assumptions, and results throughout the study. Participation and input from committee members ensures that the study complies with all requirements of local, state, and federal agencies. The TAC also provides review of technical reports and findings produced during the study and comment on the reasonableness of the approach and results. Membership includes:

- ~ City of Virginia Beach Department of Development
- ~ City of Virginia Beach Department of the Environment and Sustainability
- ~ City of Virginia Beach Department of Museums and Historic Resources
- ~ City of Virginia Beach Department of Planning, Current Planning Division
- ~ City of Virginia Beach Department of Planning, Strategic Growth Area Office
- ~ City of Virginia Beach Department of Planning, Transportation Division
- ~ City of Virginia Beach Department of Public Works, Site Acquisition Division
- ~ City of Virginia Beach Department of Public Works, Traffic Engineering Division
- ~ City of Virginia Beach Department of Utilities, Water Master Planning Section
- ~ City of Virginia Beach Fire Department
- ~ City of Virginia Beach Media and Communications Group
- ~ City of Virginia Beach Oceanfront Resort Area Administration
- ~ Dominion Virginia Power, Distribution Division
- ~ Hampton Roads Sanitation District
- ~ Hampton Roads Transit, Planning and Development Division
- ~ Hampton Roads Transit, Public Outreach Division
- ~ Naval Air Station Oceana Community Planning Liaison
- ~ Naval Air Station Oceana Installation Planning
- ~ U.S. Army Corps of Engineers - Regulatory Branch
- ~ U.S. Coast Guard
- ~ Virginia Department of Environmental Quality
- ~ Virginia Department of Historic Resources
- ~ Virginia Department of Rail and Public Transportation
- ~ Virginia Department of Transportation, Transportation and Land Use Division
- ~ Virginia Marine Resources Commission

A full list of TAC members can be found in **Appendix L** of this DEIS.

8.3 Public Coordination

Throughout the DEIS process, the public was encouraged to raise relevant issues with the project team for consideration through an open exchange of ideas and views. Public participation activities were scheduled as related technical work was conducted.

HRT made efforts to include citizens, interested community, business, and environmental groups, elected and appointed officials, local agencies, and jurisdictions. Special effort was also made to include members of the public who may be



under-represented, such as minorities, low-wage earners, and people with disabilities or special needs.

## 8.3.1 Public Involvement Plan

A Public Involvement Plan (PIP) was created to coordinate and manage public involvement for the VBTES. The PIP identified the specific participation by HRT and coordination with other related agencies. Public involvement activities were consistent with federal policy to regularly encourage public involvement.

## 8.3.2 Project Initiation Meetings

HRT relies on public comments to help identify issues as well as to gauge public sentiment about the proposed improvements. Because some of the alternatives under consideration for the project could affect adjacent property owners, a combination of measures was taken to ensure that the public was notified about the project and invited to participate in the process. On August 21, 2009, a postcard with project information and meeting invitation was sent to about 5,200 property owners within ¼ miles of the Norfolk-Southern right-of-way. In addition, invitation letters for the meeting were mailed to CAC members, TAC members, local civic league presidents, and area neighborhood associations.

The first of two project meetings, officially called *Project Initiation Meeting* was held September 9, 2009 at Princess Anne High School in Virginia Beach, Virginia. Approximately 178 individuals (this number includes HRT staff and consultant staff) signed-in throughout the duration of the open house. The second Project Initiation Meeting was held September 10, 2009, at the Virginia Beach Convention Center in Virginia Beach, Virginia. Approximately 126 individuals (this number includes HRT staff and consultant staff) signed in throughout the duration meeting.

The open house meeting began with a brief presentation designed to educate the public on the proposed project. Participants were encouraged to view display boards and visit information stations containing materials related to VBTES topics. Each information station was staffed by a knowledgeable project representative that could answer questions specific to that topic.

Advertisements ran on Thursday September 3 and Sunday September 6, 2009 in The Virginia-Pilot and the Virginia Beach Beacon.

Stories about the VBTES DEIS project appeared on WAVY 10, Channel 3 WTKR, and News 13 before both Project Initiation Meetings.

All meeting materials including meeting announcement, PowerPoint presentation, information display boards, informational handouts and comment forms were posted on the project Web site [www.gohrt.com/about/development/vbtes](http://www.gohrt.com/about/development/vbtes) for continued access to relevant project information. See **Appendix L** for project initiation meeting materials, public questions, and comments.

## 8.3.3 Public Meetings

Public meetings help HRT reach the greatest number of interested citizens and get the input they need to make important decisions about the transit extension. The Public Involvement Plan was implemented and many forms of media and advertising were used to make residents aware that the VBTES meetings were going to occur. These methods include:

- ~ Meeting announcements posted to the VBTES webpage of [gohrt.com](http://gohrt.com)
- ~ Meeting materials were posted on the VBTES website
- ~ Flyer about upcoming meetings is emailed to HRT VBTES database list – approximately 600
- ~ Flyer about upcoming meetings emailed to HRT *GovDelivery* list
- ~ HRT placed ad in Virginia Beach Beacon the Sunday before the first meeting
- ~ Customer Alert placed on HRT’s website – along with flyer – generally posted about two weeks before meetings start
- ~ HRT posted notice about the upcoming meeting on Facebook about two weeks prior to meetings, and then the day before and the day of each of the meetings

- ~ Information posted at various HRT transfer sites – Newtown Road Station, 19<sup>th</sup> & Pacific, Silverleaf, 18<sup>th</sup> Street, Pembroke East Transfer area, TCC transfer center (done by HRT Customer Service staff)
- ~ Information/flyer given to City staff and posted to their website.
- ~ Press release HRT sent to all local media at least 48 hours prior to each meeting.

See **Appendix L** of this DEIS for meeting announcement materials.

## September 2009 Public Open House Meetings

On September 9 and 10, 2009, HRT held its first public open house meetings. After a brief presentation, the open house and discussion portion of the meeting began. There were six stations, each had display boards and were staffed by City of Virginia Beach, and HRT, and consultant team members. The stations were organized by topic. The topics included:

- ~ Corridor and station areas
- ~ Evaluation measures and criteria
- ~ Environmental issues
- ~ Traffic and transportation
- ~ Strategic growth areas/comprehensive plan
- ~ Public involvement

More than 260 people attended the meetings to learn about the project and to talk with staff. Public comments were received on comment forms distributed at the meeting and by email to HRT.

Meeting announcements were posted to the VBTES webpage. Email notifications were sent out through an email subscription service *GovDelivery* to subscribers and the consultant’s database. Meeting materials were posted on the VBTES website including the PowerPoint presentation given at the meeting.

## December 2009 Station Area Workshops

Station area workshops, held on December 2 and 9, 2009, updated the community about VBTES progress since the last public meetings. These meetings also provided an overview of potential transit technologies within the project corridor and examples from other transit systems. A brief presentation informed the community about potential areas for transit stations within the proposed study area. The second part of the meeting consisted of participants breaking out into small groups in interactive setting designed to help inform the planning team about how each station area would fit into the surrounding communities. The breakout sessions were led by facilitators from the consultant team and City staff. Group breakout sessions were by VBTES Corridor segments:

- ~ **Segment 1** (Newtown to Town Center);
- ~ **Segment 2** (Town Center to Lynnhaven); and
- ~ **Segment 3** (Lynnhaven to Birdneck & Birdneck to Oceanfront)

Note takers in each session captured comments. All meeting notes were transcribed. See **Appendix L** for group notes. Meeting announcements were posted to the VBTES webpage. Email notifications were sent out through an email subscription service *GovDelivery* to subscribers and the consultant’s database.

Meeting materials, including the meeting PowerPoint presentation, summary of comment resulting from the September 2009 meeting and updated Frequently Asked Questions information sheet prior to the Station Location Workshops were posted on the VBTES website. More than 100 people attended the workshops.

Local news channels WTKR 3 and Channel 13 reported on the Station Area Workshops. These reports provided a summary of the project and directed residents to the VBTES website for further information and opportunity to comment. See **Appendix L** for the Station Area Workshop Summary that includes meeting notes and comments.

June 2010 Public Open House Meeting

On June 30, 2010, HRT held a public open house meeting to provide an overview of the work underway for the Virginia Beach Transit Extension Study (VBTES) and an update on the status of the VBTES, including the latest information about the following:

- ~ Transit technology (Bus Rapid Transit and Light Rail Transit)
- ~ Alignment alternatives east of the former Norfolk Southern railroad right of way
- ~ Potential grade separations (elevated crossings at major intersections)
- ~ Stations
- ~ East of Birdneck Alternatives
- ~ Vehicle storage and maintenance facility
- ~ Strategic Growth Areas/Transportation Technology

Following the presentation, the open house format allowed the audience to ask questions directly of HRT and City staff stationed by maps and other static displays. More than 100 people attended.

Note takers captured comments and questions from the attendees. See **Appendix L** for meeting notes and comments.

October 2012 Public Open House Meetings

On October 10, 15, 17, 22, 27, and November 1, 2012, HRT held open house meetings to reintroduce the public to the VBTES after the study was put on hold in April, 2011. Information presented included display boards that showed previous portion of the study corridor, new maps showing the Laskin Road area and its roadway system, and a new VBTES study schedule.

February 2013 Public Open House Meetings

On February 25 and 28, 2013, HRT held public open house meetings to provide an overview of how high capacity transit services could be incorporated into the Hilltop area as part of the Transit Extension Study. The meeting also offered input on how access to Hilltop might be achieved

from the original alignment and where passenger stations may be located.

Following a presentation, HRT staff addressed audience questions directly. Information boards were displayed and maps were available for the public to view. City, HRT, and consultant staff were available to address questions one-on-one following the group question-and-answer period. More than 160 people attended (see **Figure 8.3-1**).

Note takers captured comments and questions from the attendees. See **Appendix L** for meeting notes and comments.

April 2013 Public Open House Meetings

On April 18, 22, and 25, 2013, HRT held public open house meetings to present an overview of the proposed station

areas along the former NSRR right of way, the proposed Laskin Road/Hilltop station areas, and proposed Oceanfront Resort Area stations. More than 130 people attended.

Following a presentation, HRT staff addressed audience questions directly. Information boards were displayed and maps were available for the public to view. City, HRT, and consultant staff members were available to address questions directly following the group question-and-answer period (see **Figure 8.3-1**).

Note takers captured comments and questions from the attendees. See **Appendix L** for meeting notes and comments.

Figure 8.3-1 | Open House and Public Meetings, 2013 - 2014



Figure 8.3-2 | September 2013 Meeting Announcements

**VIRGINIA BEACH TRANSIT EXTENSION STUDY**

Join us for a **Public Information Session!**

*Project Capital Costs and Ridership Forecasts*

**Meeting Information:**

- **Monday, September 23, 2013**  
Westin Virginia Beach Town Center  
4535 Commerce Street  
Virginia Beach, VA 23462  
6:00 p.m. – 8:00 p.m.
- **Wednesday, September 25, 2013**  
DoubleTree by Hilton Virginia Beach  
1900 Pavilion Drive  
Virginia Beach, VA 23451  
6:00 p.m. – 8:00 p.m.
- **Thursday, September 26, 2013**  
Holiday Inn Virginia Beach – Norfolk  
5655 Greenwich Road  
Virginia Beach, VA 23462  
6:00 p.m. – 8:00 p.m.

Locations are accessible to people with disabilities. For special accommodations or language assistance, please contact Julie Tumm at 757-222-6000 ext. 6699.

**September 2013**

**Join us for a Public Information Session!**

*Project Capital Costs, Operating and Maintenance Costs, and Ridership Forecasts*

These public information sessions will provide an update on the on-going analyses being conducted as part of the Virginia Beach Transit Extension Study Draft Environmental Impact Statement. Information will be presented on the projected capital costs (construction-related) and the operating and maintenance costs (on-going annual costs) for the fixed guideway alternatives along the former Norfolk Southern right-of-way. Projected levels of ridership for all of the alternatives will also be presented.

The meetings will have a presentation followed by a question and answer session with HRT staff. The public will also have the opportunity to discuss the project's topics on an individual basis with HRT and consultant staff following the presentation.

The three meetings will have an identical format and will present identical information. Please come to the meeting that is most convenient to you.

Please call 222-6000 ext. 6699 if you require special assistance or accommodations in order to participate in these meetings. For further information, please visit <http://www.vbahrt.com> and click on link for VBTES. Para más información en español, por favor llame 757-222-6000.

**Capital Cost**

**Operations and Maintenance Cost**

**Ridership**

September 2013 Public Open House Meetings

On September 23, 25, and 26, 2013, HRT held public open house meetings to present updated capital costs, operating and maintenance costs, and ridership estimate for the fixed guideway alternatives (excluding Alternative 1A which was not included as an alternative as of this date) along the former Norfolk Southern right-of-way (see **Figure 8.3-2**).

Following a presentation, HRT staff addressed audience questions directly. Information boards were displayed and maps were available for the public to view. City, HRT, and consultant staff were available to address questions individually following the group question-and-answer period. More than 160 people attended.

Note takers captured comments and questions from the attendees. See **Appendix L** for meeting notes and comments.

February 2014 Public Open House Meetings

On February 10 and 12, 2014, public open house meetings were held to update the public on the capital costs for the Hilltop Alternative and environmental impacts of the project (see **Figure 8.3-3**). More than 60 people attended the meetings.

Following a presentation, HRT staff addressed audience questions directly. Information boards were displayed and maps were available for the public to view. City, HRT, and consultant staff were available to address more questions following the group question-and-answer period. Note takers captured comments and questions from the attendees. See **Appendix L** for meeting notes and comments.

September 2014 Public Open House Meetings

On September 22 and 24, 2014, public open house meetings were held to update the public about Alternative 1A: Town Center Alternative, including its capital costs and ridership estimate, and reviewed the potential station areas under analysis for this extension. More than 100 people attended the meetings.

Following a presentation, HRT staff addressed audience questions directly. Information boards were displayed and maps were available for the public to view. City, HRT, and consultant staff were available to address more questions following the group question-and-answer period. Note takers captured comments and questions from the attendees. See **Appendix L** for meeting notes and comments.

November 2014 Public Open House Meeting

On November 20, 2014, a public open house meeting was held to update the public on the operations and maintenance costs for the build alternatives and discuss the proposed feeder bus system. Approximately 45 people were in attendance.

Following a presentation, HRT staff addressed audience questions directly. Information boards were displayed and maps were available for the public to view. City, HRT, and

consultant staff were available to address more questions following the group question-and-answer period. Note takers captured comments and questions from the attendees. See **Appendix L** for meeting notes and comments.

8.3.4 Presentations at Community and Business Organizations

The Project Team sent about 175 project information letters to local community and business organizations. This effort resulted in about 22 requests for briefings to interested community and business groups. Briefings included a presentation and distribution of project information to that group. The project team estimates that this effort reached more than 550 attendees from project inception through August of 2014.

8.3.5 Community Advisory Committee (CAC) Meetings

The formation of a Community Advisory Committee (CAC) further allowed community members to share detailed knowledge of the community, provide their unique perspective and act as community liaisons. The project team began formation of the Community Advisory Committee (CAC) in August of 2009 by sending invitation letters to members of the community. The members of the CAC were selected by Hampton Roads Transit in collaboration with the City of Virginia Beach. The purpose of the committee is to advise HRT, the City of Virginia Beach, and the consultant team on issues and potential impacts related to the alternatives under consideration within the study corridor. The CAC is comprised of representatives from organizations that represent neighborhoods, civic leagues, places of worship, and representatives of businesses that are within the project corridor.

The first CAC meeting was held on October 28, 2009. The purpose of the first meeting was to present the CAC with project information and obtain community input. After a brief presentation, the CAC members divided into breakout groups to discuss transportation, environmental, and community impacts, and other resources within the VBTES Corridor.

The second CAC meeting was held on June 24, 2010. The purpose of the second meeting was to update the CAC on project progress including station areas, vehicle storage and maintenance facility (VSMF) issues, and East of Birdneck Alternatives. Six CAC members attended this meeting to provide both written and verbal comment on the project.

The CAC was expanded to include citizens in the Laskin Road corridor. A letter of invitation was sent by HRT to 35 stakeholders who may have a residence or business in the study area. These CAC members were asked to share their knowledge of the Laskin Road corridor, identify potential study issues in the area, and help identify solutions to issues raised.

Figure 8.4-1 | VBTES Website

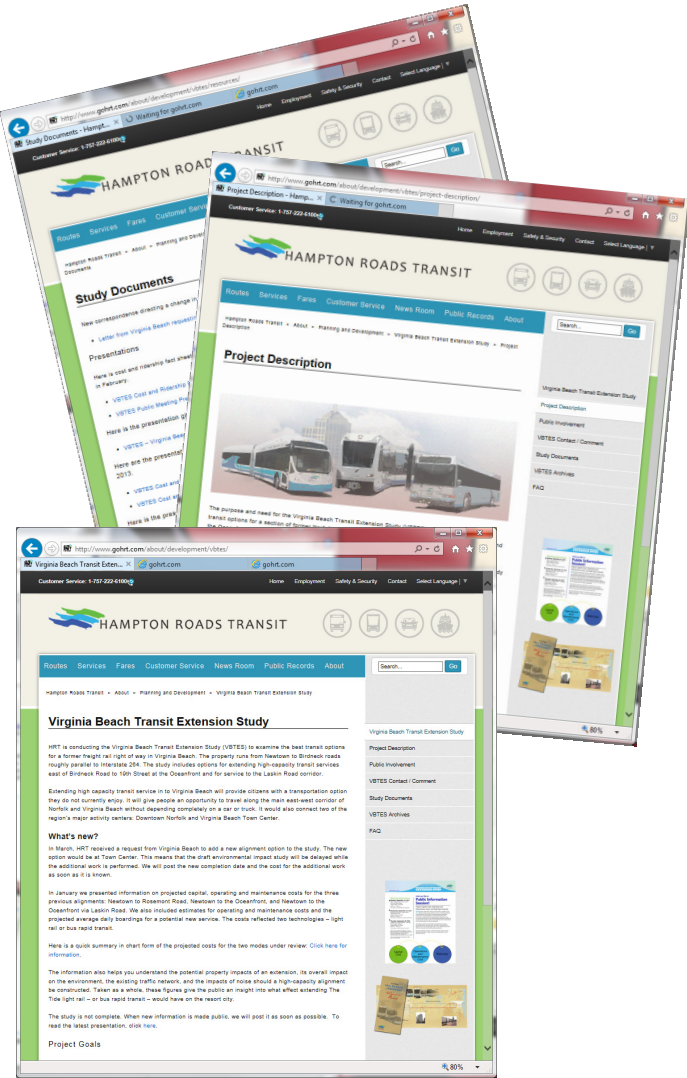
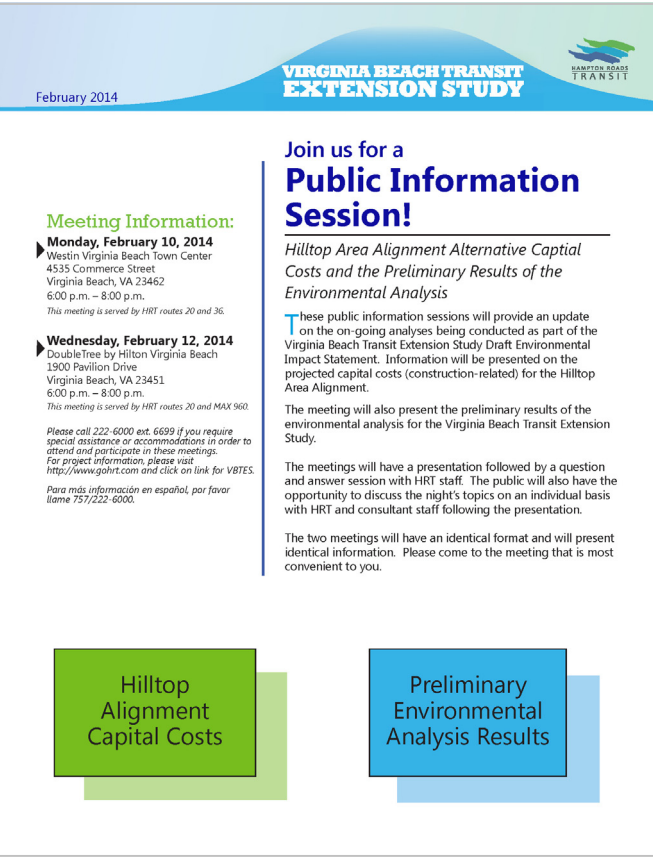


Figure 8.3-3 | February 2014 Meeting Flyer



The third CAC meeting was held on February 21, 2013. The purpose of this meeting was to present the CAC members with Laskin Road corridor-specific project information and obtain community input. After a brief presentation, questions from CAC members were addressed by HRT staff.

The fourth CAC meeting was held on April 17, 2013. The purpose of this meeting was to update the CAC members about the proposed station and Park & Ride locations. After a presentation, questions from the CAC members were addressed by HRT staff.

The fifth CAC meeting was held on February 6, 2014. The purpose of this meeting was to update the CAC members about potential property impacts. After a presentation, questions from the CAC members were addressed by HRT staff.

Regular emails and newsletters mailings were sent to CAC members to keep them up-to-date on developments throughout the life of the project.

The CAC is important to the process because its members provide unique input that combines ongoing, detailed knowledge of the project with the perspectives of community residents and business owners. See **Appendix L** for a list of CAC members.

## 8.4 Other Public Outreach

### 8.4.1 Website



A project website, <http://www.gohrt.com/about/development/vbtes> (see **Figure 8.4-1** on previous page), was set up to provide up-to-date information to interested parties. Meeting materials including presentations given, information boards displayed, and handouts distributed were posted on the project website. The website also allowed for the community to access and electronically submit comment forms. As of August 18, 2014 the VBTES website has been viewed over 40,000 times.

### 8.4.2 Facebook



HRT maintains a Facebook page for public outreach purposes which will include project announcements. Facebook users may leave comments on the page.

### 8.4.3 Twitter



HRT maintains a Twitter page for public outreach purposes, which will include project announcements. Twitter users may leave comments on the page.

### 8.4.4 Correspondence



Marie Arnt, Public Outreach Coordinator for the Virginia Beach Transit Extension Study, managed email, written, and telephone correspondence for the project. Participants were given Ms. Arnt's direct email address, telephone number, and mailing address. Ms. Arnt also attended all public, agency, TAC, and CAC meetings.

### 8.4.5 Distribution Database



HRT and the project team maintained and updated a contact database of all relevant elected and appointed officials, agencies, and consultants at the federal, regional, state, and local levels; interested parties; individual stakeholders (business or resident) and groups; and civic associations. HRT's communications database, *GovDelivery*, tracked all inquiries, comments, and responses submitted to HRT. Notice of all public meetings, newsletters, and email updates was sent to each listed contact. See **Appendix L** for the distribution list.

### 8.4.6 Newsletters



Newsletters containing study updates were produced and distributed at key project milestones during the study period. This includes a newsletter for project initiation and six additional project update newsletters (as of February 2014). Newsletters are distributed electronically to all interested parties on the project email list maintained by HRT. See **Appendix L** for project newsletters.

### 8.4.7 Email Update



In addition to newsletters, e-mail updates were produced and sent monthly to all contacts in the *GovDelivery* database. As of August 2014, approximately 6,500 email updates were sent to interested parties.

### 8.4.8 Press Releases/Media Contacts/News Articles



News releases were used to help distribute information to a wider audience by seeking coverage through television, radio, Internet, and in print. HRT used a variety of tools to communicate project information to the media, including making experts available for interviews, press releases, and public service announcements. See **Appendix L** for press releases, other media, and articles.

HRT drafted and distributed eight press releases with updates of the VBTES project. These were distributed in July and December 2009, June, 2010, February, April, and September 2013, and February and September, 2014.

More than a thousand print news articles, editorials, and Letters to the Editor relevant to the VBTES project have been published in local newspapers and magazines from project initiation in 2009 to the present. Local television news media, websites, and blogs have also regularly reported about the VBTES. All news articles will be posted to HRT's Press Room on HRT's webpage, [www.gohrt.com](http://www.gohrt.com).

### 8.4.9 Stakeholder Interviews



Stakeholder interviews and group interviews were conducted July – September 2009. Thirty-three (33) individuals or groups were interviewed and five stakeholders responded in writing to our interview questionnaire. Stakeholders were selected by either their proximity to the study corridor or leadership position in special interest organizations.

The purpose of these interviews was to incorporate participant interests and concerns into the project development process. A strong cross-section of stakeholders interviewed represented such interests as environment, education, business, economic development, bike and trails, and tourism. Topics of interest to

stakeholders included right-of-way, project schedule, project costs, appearance of the light rail, displacement concerns, grade separation, a possible referendum in support of light rail expansion into Virginia Beach, and others. See **Appendix L** for a list of stakeholder interviews.

## 8.5 Conclusion

The public involvement process was robust and inclusive. The Public Involvement Plan was implemented beyond what was proposed. The public meetings attracted more than 700 attendees. The more than 1,000 news articles, editorials, and Letters to the Editor in traditional and digital form, as well as extensive television media coverage, demonstrates a high media interest in this study.

Every opportunity was provided for citizens to engage in this study. They had options to communicate by email, letters, public meetings, telephone, or fax. Every comment, question, or concern was recorded and saved. We developed and widely distributed newsletters and posted every form of display and communication so the public could have access at any time. All collateral materials used at meetings were promptly posted on the VBTES website or copies were mailed to those without Internet access. Those materials included display boards, newsletters, maps, and PowerPoint presentations.

Briefings before the Transportation District Commission of Hampton Roads and Virginia Beach City Council were all public meetings. These briefings occurred prior to each public open house meeting so information was readily available to citizens even in advance of the public open house meetings.

This study and the process to engage the public began and remains transparent throughout the study period.

# Appendix A | List of Preparers

Appendix A





Hampton Roads Transit has prepared the Virginia Beach Transit Extension Study DEIS with the assistance of a team of consultants. The following personnel were instrumental in the preparation of this document.

Hampton Roads Transit	
Name	Role
Julie Timm, AICP, CEP	Project Manager/Transit Development Officer
Ray Amoruso	Chief Planning and Development Officer
Lee Roy Padgett, P.E.	Director of Engineering
Marie Arnt	Senior Public Outreach Coordinator
Don Lint	Director of Construction

Consultant Team			
Firm/Staff	Degree	Professional Certification/Licenses	DEIS Contribution

HDR

Eric Nelson	B.S., M.C.R.P	American Institute of Certified Planners	Project Manager
Marcus Arnold	B.A.	American Institute of Certified Planners	Planning/Operations
Jeanne Barnes	B.A., M.A.		Cultural Resources
Jim Barone	B.S.	Professional Landscape Architect	Station Design/Urban Design
Robin Bedenbaugh	B.S., M.S.	Professional Wetland Delineator	Ecological Resources
Scott Bishop		Certificate of Management-Building Information Modeling, Certified Estimating Professional	Cost Estimation
Rachel Bowdoin	B.S.		Visual Impacts/Safety and Security
Adam Buck	B.S., M.A.E.	Engineering Intern	Noise and Vibration
Carey Burch	B.S., M.S.	American Institute of Certified Planners	Planning
Benjamin Camras	B.A., M.U.R.P.		Planning
Tim Casey	B.S.	Institute of Noise Control Engineering	Noise and Vibration
Chad Chandler	B.S., M.S.	Professional Engineer	Rail/Roadway Design
Brittany Dowdy	B.S.	Engineer In Training	Rail Design
Richard Glassen	B.S., M.S.	Professional Engineer	Cost Estimation
Jason Granado	B.Arch, M.L.A.		Station Design/Urban Design
Karen Harrington	B.S.	Professional Engineer	GIS Analysis
Gina Jarta	B.A.	Institute of Noise Control Engineering	Noise and Vibration
Nicholas Karcz	B.A.		Travel Forecasting
Amanda Lutke	B.A., M.U.R.P.	American Institute of Certified Planners	Planning
Thomas Marking	B.A., M.C.R.P.	American Institute of Certified Planners	Planning
John Mason	B.S.C.E.		Operation & Maintenance/Cost Estimation
Thomas More	B.A., M.U.R.P.	American Institute of Certified Planners	Environmental Justice



Consultant Team			
Firm/Staff	Degree	Professional Certification/Licenses	DEIS Contribution
HDR			
Terri Morrell	B.S., M.S.	American Institute of Certified Planners	Planning
Michele Myers	B.F.A.		Graphics
Christopher Riviere	B.S.	Professional Engineer	Rail Design/Cost Estimation
Mike Rose	B.S.		Travel Forecasting
Michael Snyder	B.S.	Professional Engineer	Roadway Design
Norman Wagner	B.S.	Professional Engineer	Cost Estimation
Dustin Watson	B.S., M.E.P	American Institute of Certified Planners	Noise and Vibration
Paul Weishar	B.A., M.F.A.		Cultural Resources
Fitzgerald & Halliday, Inc			
Drew Draper	B.S., M.S.	Certified Professional Transportation Planner	Traffic
Stephanie Dyer-Carroll	B.A., M.A.	American Institute of Certified Planners	Environmental Planning
Ron Gautreau	B.S., M.S.		Environmental Planning
Carol Gould	B.S.	American Institute of Certified Planners	Environmental Planning
Dan Hageman	B.S.	Certified Soil Scientist	Environmental Planning
David Laiuppa	B.S., M.S.	Certified Erosion, Sediment, and Storm Water Inspector, Certified Soil Scientist	Environmental Planning
Marcy Miller	B.S., M.U.R.P.	American Institute of Certified Planners	Environmental Planning
Paul Stanton	B.S., M.S.		Environmental Planning
Carla Tillery	B.S., M.S.		Traffic
Josh Weiss	B.A.		Environmental Planning
The Miles Agency			
Delceno Miles	B.A.		Public Involvement



# Appendix B | List of Recipients

Appendix B





B.0 List of Recipients

The following federal, state, and local officials, agencies, community groups/organizations, and individuals have been sent either a printed copy of this DEIS, a complete electronic copy of this DEIS on CD, or a link to the document on the HRT website (www.gohrt.org).

B.1 Legislators

B.1.1 U.S. Senators

- ~ Senator Tim Kaine
- ~ Senator Mark Warner

B.1.2 U.S. Representatives

- ~ Representative Robert Wittman
- ~ Representative Scott Rigell
- ~ Representative Robert Scott
- ~ Representative Randy Forbes

B.1.3 Virginia Assembly

House of Delegates

- ~ Delegate Glenn Davis - 84<sup>th</sup> District
- ~ Delegate William DeSteph - 82<sup>nd</sup> District
- ~ Delegate Daun Sessoms Hester - 89<sup>th</sup> District
- ~ Delegate Matthew James - 80<sup>th</sup> District
- ~ Delegate Johnny Joannou - 79<sup>th</sup> District
- ~ Delegate Chris Jones - 76<sup>th</sup> District
- ~ Delegate Barry Knight - 81<sup>st</sup> District
- ~ Delegate James Leftwich - 78<sup>th</sup> District
- ~ Delegate Robert Bloxom - 100<sup>th</sup> District
- ~ Delegate Lionell Spruill - 77<sup>th</sup> District
- ~ Delegate Chris Stolle - 83<sup>rd</sup> District
- ~ Delegate Scott Taylor - 85<sup>th</sup> District

Senate

- ~ Senator Kenneth Alexander - 5<sup>th</sup> District
- ~ Senator John Cosgrove, Jr. - 14<sup>th</sup> District
- ~ Senator Lynwood Lewis - 6<sup>th</sup> District
- ~ Senator Mamie Locke - 2<sup>nd</sup> District
- ~ Senator Louise Lucas - 18<sup>th</sup> District
- ~ Senator Jeffrey McWaters - 8<sup>th</sup> District
- ~ Senator John Miller - 1<sup>st</sup> District
- ~ Senator Thomas Norment - 3<sup>rd</sup> District
- ~ Senator Frank Wagner - 7<sup>th</sup> District

B.2 Public Agencies

B.2.1 Federal Agencies

- ~ Advisory Council on Historic Preservation, Washington, D.C.
- ~ Council on Environmental Quality, Washington, D.C.
- ~ Federal Aviation Administration, Washington, D.C.
- ~ Federal Emergency Management Agency, Washington, D.C.
- ~ Federal Highway Administration, Richmond, VA
- ~ Federal Railroad Administration, Washington, D.C.
- ~ Federal Transit Administration, Washington, D.C.
- ~ Naval Air Station Oceana, Virginia Beach, VA
- ~ U.S. Army Corps of Engineers - Norfolk District, Norfolk, VA
- ~ U.S. Coast Guard, Portsmouth, VA
- ~ U.S. Department of Health & Human Services, Philadelphia, PA
- ~ U.S. Department of Housing & Urban Development, Washington, D.C.
- ~ U.S. Department of the Interior, Office of Environmental Policy and Compliance, Washington, D.C.
- ~ U.S. Environmental Protection Agency - Region III, Philadelphia, PA

B.2.2 State Agencies

- ~ Office of the Governor of Virginia
- ~ VA Department of Conservation & Recreation
- ~ VA Department of Environmental Quality
- ~ VA Department of Forestry
- ~ VA Department of Game & Inland Fisheries
- ~ VA Department of Health
- ~ VA Department of Historic Resources
- ~ VA Department of Mines, Minerals, and Energy
- ~ VA Department of Rail and Public Transportation
- ~ VA Department of Transportation
- ~ VA Economic Development Partnership
- ~ VA Institute of Marine Science
- ~ VA Marine Resources Commission
- ~ VA Port Authority

B.2.3 Virginia Beach City Council Members

- ~ William D. Sessoms, Jr., Mayor, City of Virginia Beach
- ~ Louis R. Jones, Vice Mayor, City of Virginia Beach
- ~ Benjamin Davenport
- ~ Bob Dyer
- ~ Barbara M. Henley
- ~ Shannon DS Kane
- ~ John D. Moss
- ~ Amelia N. Ross-Hammond
- ~ John E. Uhrin
- ~ Rosemary Wilson
- ~ James. L. Wood

B.2.4 Virginia Beach Municipal Officials/Agencies

- ~ James K. Spore - City Manager
- ~ Cindy A. Curtis - Deputy City Manager
- ~ David L. Hansen - Deputy City Manager
- ~ Doug Smith - Deputy City Manager
- ~ Ruth Hodges Fraser - City Clerk
- ~ William “Jack” Whitney, Jr., Director - Department of Planning & Community Development
- ~ Barry Frankenfield - Strategic Growth Area Office Manager
- ~ Brian Solis - Transportation and Transit Manager
- ~ Warren D. Harris - Director of Economic Development
- ~ Patricia A. Phillips - Director of Finance
- ~ Phillip A. Davenport - Interim Director of Public Works
- ~ John E. Fowler - City Engineer
- ~ Robert Gey - City Transportation Engineer
- ~ Thomas M. Leahy, III - Director of Public Utilities
- ~ Eva Poole - Director of Public Libraries
- ~ James B. Ricketts - Director, Virginia Beach Convention & Visitors Bureau
- ~ Michael J. Kalvort - Director of Parks and Recreation
- ~ Andrew Friedman - Director of Housing and Neighborhood Preservation
- ~ Catheryn Whitesell - Director of Management Services
- ~ Dr. Aaron C. Spence - Superintendent, Virginia Beach City Public Schools
- ~ Bobby Wheeler - Engineering Services Manager
- ~ Clay Bernick - Administrator, Virginia Beach Environment and Sustainability Office
- ~ Mike Eason - Resort Administrator, Oceanfront Resort Area Management Office



B.2.5 Regional Agencies

- ~ Hampton Roads Transportation Planning Organization
- ~ Norfolk Airport Authority
- ~ United Way of South Hampton Roads
- ~ Virginia Maritime Association

B.2.6 Libraries

- ~ Meyera E. Oberndorf Central Library
- ~ Bayside Special Service Library
- ~ Great Neck Area Library
- ~ Joint - Use Library (TCC/City of Virginia Beach)
- ~ Kempsville Area Library
- ~ Oceanfront Area Library
- ~ Princess Anne Area Library
- ~ Pungo - Blackwater Library
- ~ Slover Library
- ~ Wahab Public Law Library
- ~ Windsor Woods Area Library

B.3 Other Agencies/  
Organizations

- ~ Central Business District Association of Virginia Beach
- ~ Eastern Shore Chapel Church
- ~ Paul D. Fraim, Mayor, City of Norfolk
- ~ Hampton Roads Chamber of Commerce
- ~ Hampton Roads Public Transportation Alliance
- ~ Hilltop Family YMCA
- ~ Marcus D. Jones, City Manager, City of Norfolk
- ~ League of Women Voters of South Hampton Roads

- ~ Light Rail Now
- ~ London Bridge Baptist Church
- ~ Lynnhaven Mall
- ~ Mt. Trashmore Family YMCA
- ~ NAACP
- ~ New Journal and Guide
- ~ Pembroke Mall
- ~ Retail Alliance
- ~ Rock Church
- ~ Seatack Civic League
- ~ Sentara Virginia Beach General Hospital
- ~ Sierra Club
- ~ Tidewater Builders Association
- ~ Town Center of Virginia Beach
- ~ Urban League of Hampton Roads
- ~ The Virginian Pilot
- ~ Virginia Beach Council of Civic Organizations
- ~ Virginia Beach Friends School
- ~ Virginia Beach Hotel Association
- ~ Wave Church
- ~ WAVY/WVBT - TV
- ~ WHRO - 15
- ~ WTKR - TV
- ~ WVEC-TV

B.4 Interested Parties

- ~ Cox Communications
- ~ Dominion Virginia Power
- ~ Hampton Roads Sanitation District
- ~ Norfolk Southern Railroad
- ~ Verizon
- ~ Virginia Natural Gas



# Appendix C | Glossary

Appendix C





Appendix C: Glossary and List of Abbreviations

C.1 Glossary

**accessibility** – A measure of the ability or ease of all people to travel among various origins and destinations.

**air installations compatible use zone (AICUZ)** – Department of Defense guidelines that define zones near air installations that have high noise and accident potential. The guidelines recommend land uses that the Department of Defense deems compatible within these zones.

**air pollution** – The presence of unwanted material in the air in sufficient amount and under such circumstances as to interfere significantly with human comfort, health, or welfare, or with full use and enjoyment of property. National and state ambient air quality standards identify pollutant concentrations not to be exceeded over a specified time.

**alignment** – A ground plan or route of a railroad, highway, or fixed guideway transit.

**ambient air quality** – A physical and chemical measure of the concentration of various chemicals in the outside air, usually determined over a specific time period (e.g., one hour, eight hours).

**Americans with Disabilities Act (ADA)** – A federal civil rights law enacted in 1990 that mandates the provision of access to public facilities for persons with disabilities. Title 2 of the law applies to transportation facilities and transit vehicles.

**aquifer** – A water-bearing underground layer of permeable rock, sand, or gravel.

**at-grade** – at the same level.

**Automated Fare Control (AFC)** – A system of fare control that utilizes machines to issue tickets in return for a specified fare, or to confirm validity of pre-purchased

tickets.

**A.M. Peak Period** – The morning rush hours -approximately 6:30 a.m. to 9:30 a.m.

**ballasted track** – a form of railroad track involving rail and cross ties placed on a stone bed

**Base Year** – The first year of a planning or forecast period. The base year of the Virginia Beach Transit Extension planning period is 2013.

**Build Year - also known as horizon year** – The year for which traffic and population projections have been made and transportation needs analyzed; 2034 is the horizon year for the Virginia Beach Transit Extension Project.

**bus lane** – A traffic lane for dominant or exclusive use by commuter buses.

**bus rapid transit (BRT)** – An enhanced bus system that operates on bus lanes or other transitways in order to combine the flexibility of buses with the efficiency of rail. By doing so, BRT operates at faster speeds, provides greater service reliability and increased customer convenience. It also utilizes a combination of advanced technologies, infrastructure, and operational investments that provide significantly better service than traditional bus service.

**calibration** – In travel demand modeling, the procedure used to estimate the parameters of a model in order to replicate actual measurements of travel behavior and conditions.

**capital costs** – The cost of designing, constructing, purchasing equipment (e.g., vehicles), and implementing a transit system.

**catenary power system** – An electric power system and overhead contact wire which is supported from one or more longitudinal wires or cables used to provide a power source for vehicles via a pantograph (contact mechanism) on the roof of the vehicle.

**center platform** – a station platform located between two tracks that serves both directions of travel.

**central business district (CBD)** – The primary downtown area of a city, or an area of concentrated retail activity.

**Clean Air Act Amendments (CAAA) of 1990** – A federal law enacted in 1990 that places new federal controls on all sources of air pollution including mobile sources (automobiles). The CAAA include an implementation strategy and establish air quality improvement requirements.

**commuter bus** – Bus service provided along major arterial roads with limited stops, accessing a major destination point with both pedestrian and automobile access.

**commuter rail (high capacity rail)** – A system of relatively long trains operating at high speed over long distances. This service can be both local and express, and may be accessed by both pedestrians and automobiles.

**commutation** – The act or process of commuting; making a regular trip (e.g., to the workplace).

**consist** – The make-up or composition of a train or number of cars and a specific type of vehicle.

**determination of eligibility** – The decision of the State Historic Preservation Officer (SHPO) on whether candidate historic properties or resources are qualified for the State and/or National Register of Historic Places.

**endangered species** – A species whose prospects for survival within the state are in immediate danger based on a loss of habitat, over-exploitation, predation, competition, or disease. An endangered species requires immediate attention or extinction will likely follow. (See **threatened species**)

**Environmental Impact Statement (EIS)** – A comprehensive study of potential environmental impacts related to federally-assisted projects. Projects for which an EIS is required are defined in the National Environmental Policy Act of 1969, as amended.

**environmental site assessment (Environmental Screening Analysis, Phase I)** – The environmental screening analysis

consists of a “windshield” survey of the proposed route to observe possible signs of contamination from past or present land uses on or near the route; an environmental database search of the corridor; and government agency contacts. Phase I assessment consists of inquiries and record searches concerning past and present uses of a property. Phase II involves sampling and testing of soil, water, and materials from the site for hazardous materials.

**express service** – Transit to/from a destination with limited or no stops along its route.

**feeder service** – A local transit service that collects or distributes riders and provides a direct transfer to other high-capacity transit modes.

**floodplain** – Land area likely to be submerged during a flood.

**FTA** – Federal Transit Administration of the US Department of Transportation.

**fugitive dust** – Airborne dust particles resulting from construction, demolition, and other induced activity, which can significantly impact air quality in the project area.

**grade crossing** – A crossing with roadways and/or railroads on the same level, resulting in an at-grade intersection.

**grade separation** – The construction of a roadway and/or railroad over or under an intersecting roadway or railroad.

**headway** – The scheduled time between transit vehicles operating on a particular transit route.

**heavy rail** – An electric railway with high passenger carrying capacity, characterized by exclusive rights-of-way, multi-car trains, high speed and high-level platform passenger loading.

**high-occupancy vehicle (HOV)** – A vehicle carrying two or more individuals. HOVs are encouraged as a means of decreasing vehicle miles traveled (VMT).

**household income** – The total combined income of all members of a single household.

**infill development** – Real estate development on undeveloped property within a developed area.

**infrastructure** – The physical support network such as roads, railroads, and utilities, of a given geographical area.

**intermodal transfer** – The ability to move from one mode of transportation to another (e.g., bus to train) to complete a trip to a final destination site.

**joint development** – A shared effort on the part of two or more parties to develop the areas around proposed stations or adjacent to alternatives.

**kiss-n-ride** – A drop-off and pick-up area for transit users being driven by car to a transit station or transfer point.

**level of service (LOS)** – A set of descriptive characteristics used to indicate the quality of transportation service provided, including characteristics that are quantifiable (e.g., frequency, travel time, travel cost, number of transfers, safety) and those that are difficult to quantify (e.g., availability, comfort, convenience, modal image, and roadway conditions).

**light rail transit (LRT)** – An electric railway with a medium passenger capacity which can use exclusive or shared rights-of-way, or operate in mixed traffic with autos, high-or low-level platform passenger loading, and multi-car or single car trains. Light rail vehicles operate on steel wheels on steel rails and receive power from an overhead (catenary) wire.

**limits of disturbance (LOD)** – The boundary within which construction, materials storage, grading, landscaping , and related activities shall occur.

**link** – A section of a transportation system network which connects two nodes. It may be one way or two way.

**local bus** – Bus service with multiple stops along a fixed route.

**low-floor vehicle** – A transit vehicle that permits passenger boarding from low-level platforms. The proposed LRT vehicles would be approximately 14 inches above top of rail.

**low-level platforms** – Station platforms located at-grade or several inches above grade.

**mass transportation** – Shared transportation services either publicly-or privately-owned, provided to the public on a regular and continuing basis (not including school bus, charter, or sightseeing service).

**master plan** – Public document adopted by a local government as a policy guide for decisions about the physical and/or economic development of the community.

**mean high water line** – The average of all the high water heights observed over a 19-year period (tidal epoch).

**mean low water line** – The average of all the low water heights observed over a 19-year period (tidal epoch).

**minimum operable segment (MOS)** – A project phase that can be built independently, connecting logical termini, so that its usefulness as a transportation investment does not depend upon the implementation of subsequent phases.

**mitigation** – Measures designed to lessen or eliminate the impacts resulting from a proposed project or action.

**mobile source air toxics (MSATs)** – Compounds emitted from highway vehicles and non-road equipment which are known or suspected to cause cancer or other serious health and environmental effects.

**mode** – A form of travel (e.g., walking, automobile, bus, train).

**mode split** – The portion of total person trips generated for a region that are assigned to a specific type of transportation (i.e. transit, automobile, etc.) usually expressed as a percentage of total trips. This is often used in developing traffic volume and transit ridership forecasts.

**National Register of Historic Places** – The federal list of buildings and sites determined to have historical significance.

**neighborhood cohesion** – The common characteristics of members and elements of a neighborhood which affords them a unique sense of place and identity.

**No Build Alternative** – Future conditions of an area in the absence of a proposed project; what would happen if the project were *not* built.

**non-attainment area** – A geographical region which fails to attain or conform to established environmental standards (e.g., air quality, water quality).

**off-peak period** -In transit, the base period or the hours between and after the morning and afternoon rush hours.

**operating costs** – The daily operating expenses for a transit system.

**overhead contact system (OCS)** – The poles and overhead wires that supply power to light rail vehicles.

**ozone** -An unstable form of oxygen, O<sub>3</sub>, formed by a photochemical reaction of atmospheric gases with solar ultraviolet radiation. Ozone is a harmful air pollutant in the lower atmosphere and contributes to the formation of smog.

**Park & Ride** – A parking area provided for commuters at the transit station.

**particulate matter (PM)** - a complex mixture of extremely small particles and liquid droplets. Particle pollution is made up of a number of components, including acids (such as nitrates and sulfates), organic chemicals, metals, and soil or dust particles.

**passenger miles (passenger kilometers)** – The transportation of one passenger a distance of one mile (kilometer).

**peak period** – The period during which the maximum amount of travel occurs. It may be specified as the morning (a.m.) or afternoon/evening (p.m.) peak. It is the period when demand for transportation services is heaviest.

**P.M. Peak Period** – The afternoon rush hours - approximately 4:00 p.m. to 6:30 p.m.

**per capita income** – The total combined income of a household, block group, or census tract, divided by the total number of persons in that group.

**Preferred Alternative** – The alternative recommended by the Transportation District Commission of Hampton Roads which the agency feels best meets the needs of the region's transportation goals, is responsive to community concerns and input, and which has been considered in relation to the social, economic, and environmental impacts of the proposed alternatives.

**public transportation** – Regular transportation service to the public using a route or routes from one fixed point to another. Routes and schedules of this service may be predetermined through a cooperative agreement. Subcategories include public transit service and paratransit services that are available to the general public.

**rapid transit** – A transit mode which operates on exclusive right-of-way; characterized by high speed, capacity, reliability, and safety.

**Record of Decision (ROD)** – A formal decision granted by the lead Federal Agency which provides a written record of the agency's decision on a Final Environmental Impact Statement (FEIS). The ROD documents any conditions or mitigation measures committed to in the FEIS and must be made public.

**response route** – An established route regularly used by emergency vehicles (e.g., police, fire, ambulance) in traveling from their base or station to the location of a call.

**response time** – The time period between the placement of an emergency call and the arrival of emergency vehicle(s) at the location of the call.

**right-of-way (ROW)** – Parcel(s) of land intended to be utilized as a road, rail line, utility service, buffer, or similar use.



**Scoping** – The process of defining and refining alternatives for a major capital investment study DEIS. The scoping process provides opportunities for input from the public.

**side platform** – a station platform located to the outside of the tracks. Side platforms in a double track configuration would consist of a total of two platforms, with one platform per track.

**State Historic Preservation Office (SHPO)** – A state administrative agency responsible for compliance with historic preservation rules, laws, and regulations.

**Stream Encroachment Permit** – A federal and ftate Army Corps of Engineers permit required for projects placing fill within floodplains.

**streetcar, trolley** – A street transit mode consisting of electrically-powered rail vehicles, traffic lanes with cars, trucks, and buses. Light rail transit (LRT) is the modern day version of streetcars and trolleys that operate in exclusive right-of-way.

**threatened species** – A species that may become endangered if surrounding conditions begin or continue to deteriorate. (See **endangered species**)

**transit-oriented development (TOD)** – A type of community development that includes a mixture of housing, office, retail, and/or other amenities integrated into a walkable neighborhood and located within a half-mile of quality public transportation.

**Transportation Management Plan (TMP)** – A comprehensive plan or program designed to more effectively use existing transportation resources or reduce the future need to expand transportation infrastructure.

**traction power substation (TPSS)** – An an electrical substation that converts electric power from the form provided by the electrical power industry for public utility

service to an appropriate voltage, current type, and frequency to supply traction current to railways, streetcars, or trolleybuses.

**travel time** – The time it takes to travel from an origin to a destination.

**trip** – A single or one-way movement to or from a location.

**trip ends** – The total number of trips entering and leaving a specific location within a designated period of time. Each trip has two trip ends.

**trip generation** – The total number of trip ends (person trips or vehicle trips) produced by a specific land use or activity.

**trip linking** – The ability to visit several destinations during one journey.

**USACOE Individual Permit** – A US Army Corps of Engineers (USACOE) wetland fill permit that is required when a project exceeds the limitations outlined in the various Nationwide Permits or when there is no Nationwide Permit that applies to a project.

**USACOE Nationwide Permit** – A general wetland fill permit designed for projects resulting in minor disturbances to wetlands.

**uplands** – Land other than wetlands that are well-drained and rarely, if ever, inundated.

**vehicle miles traveled (VMT)** – An average that describes the total number of miles traveled in an automobile per individual for a specified area.

**walk-on station** – A type of transit stop, where the majority of users walk to the stop and parking is provided.

**Water Quality Certificate** – A permit required for all projects subject to federal permitting for discharge into state waters and/or wetlands to ensure that all such activities are consistent with Virginia water quality standards and management policies.

**wetland transition area** – The area between wetlands and surrounding uplands.

**wetlands** – Tidal areas or swamps with soil characteristics and vegetation that meet certain criteria on which filling and development are federally-and/or state-regulated.

**zoning ordinance** – A municipal ordinance which divides a municipality into districts and prescribes land use type, land use relationships, densities, height and setback, and related elements within a defined municipal boundary.

C.2 List of Abbreviations

AA	Alternatives Analysis
AC	alternating current
ACHP	Advisory Council on Historic Preservation
ADA	Americans with Disabilities Act
AFC	Automated Fare Collection
AGT	automated guideway transit
AICUZ	air installation compatible use zones
AMSL	above mean sea level
APE	Area of Potential Effects
APS	American Physical Society
ASTM	American Society for Testing and Materials
BRT	bus rapid transit
CAAA	Clean Air Act Amendments of 1990
CBD	central business district
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability List
CFR	Code of Federal Regulations
CO	carbon monoxide
DC	direct current
DEIS	Draft Environmental Impact Statement
EIS	Environmental Impact Statement
EO	executive order



EMF	electro-magnetic field	MOA	memorandum of agreement	RR	rail road	VHT	vehicle hours traveled
EPA	United States Environmental Protection Agency	MOU	memorandum of understanding	SEL	Sound Exposure Level	VMT	vehicle miles traveled
FEIS	Final Environmental Impact Statement	MOS	minimum operable segment	SIP	State Implementation Plan	VOC	volatile organic compounds
FFGA	full funding grant agreement	MPO	metropolitan planning organization	SMSA	standard metropolitan statistical area (US Census)	vph	vehicles per hour
FHWA	Federal Highway Administration	MSAT	mobile source air toxics	SHPO	State Historic Preservation Office(r) State	VSMF	vehicle shop and maintenance facility
FTA	Federal Transit Administration	NAS	Naval Air Station	SWLF	solid waste landfills (database)		
HABS	Historic American Building Survey	NAAQS	National Ambient Air Quality Standards	TPSS	traction power substation traction power substation		
HAER	Historic American Engineering Record	NEPA	National Environmental Policy Act of 1969, as amended	TOD	transit-oriented development		
HOV	high-occupancy vehicle	NOx	oxide of nitrogen	TAZ	Transportation Analysis Zone		
HRPDC	Hampton Roads Planning District Commission	NPL	National Priorities List	TCU	Transportation, Communication, and Utilities (land use category)		
HRT	Hampton Roads Transit	NRHP	National Register of Historic Places	TIP	Transportation Improvement Program		
HRTDC	Hampton Roads Transportation District Commission	NWI	National Wetlands Inventory	TMP	Transportation Management Plan		
HRTPO	Hampton Roads Transportation Planning Organization	OHMs	oils and hazardous materials oils and hazardous materials	TRT	Tidewater Regional Transit		
ISRA	Industrial Site Remediation Act	OCS	overhead contact system overhead contact system	TSM	transportation systems management		
IRIS	Integrated Risk Information System	O3	ozone	USC	United States Code		
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991	PM	particulate matter	USACOE	United States Army Corps of Engineers		
LOD	limits of disturbance	pcph	passenger cars per hour	USDOT	United States Department of Transportation		
LOS	level of service	PMSA	primary metropolitan statistical area (US Census)	USFWS	United States Fish & Wildlife Service		
LPA	locally preferred alternative	ROD	record of decision record of decision	USNPS	United States National Park Service		
LRT	light rail transit	RCRA	Resource Conservation and Recovery Act	UST	Underground Storage Tank		
LRV	light rail vehicles	RCRIS	Resource Conservation and Recovery Information System	VBTES	Virginia Beach Transit Extension Study		
LUST	Leaking Underground Storage Tank	ROW	right-of-way	v/c	volume to capacity (ratio)		
MIS	Major Investment Study			VDEQ	Virginia Department of Environmental Quality		

